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(54) Title: PREPAINTS AND METHODS OF PREPARING PAINTS FROM THE PREPAINTS

(57) **Abstract:** The preparation of a paint line using sets of prepaints containing a latex polymer binder. At least one of which contains a latex polymeric binder, is also described. The paints may be applied to architectural coatings, elastomeric coatings, and non-cementitious, aggregate finish coatings suitable for application on a wall directly or as a topcoat.

PREPAINTS AND METHODS OF PREPARING PAINTS FROM THE PREPAINTS

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Provisional Applications Ser. Nos. 60/183,655 filed February 18, 2000, 60/183,656 filed February 18, 2000 and 60/247,639 filed November 10, 2000.

BACKGROUND OF THE INVENTION

Field Of The Invention

This invention relates to sets of prepaints methods of formulating paint lines using the sets of prepaints, useful as architectural coatings, elastomeric coatings and non-cementitious, aggregate finish coatings.

Description of Related Art

For decades, professional painters/contractors and do-it-yourself consumers have been able to purchase paints that are tinted at the point-of-sale rather than at the manufacturing facility. This postponement of product differentiation permits the buyer to specify the desired color of the paint from a wide variety of choices rather than a limited number of colors once produced by the paint manufacturer.

While not practiced commercially, it is also theoretically known in the paint industry to postpone product differentiation of the paint components themselves as long as possible in the paint manufacturing process. See, for example, Carola Grundfelt-Forsius' paper in *Faerg Lack Scand.* 43(2), pages 5-6 (1997) which describes the use of intermediaries, *i.e.*, mixtures of several of the paint raw material ingredients, that are mixed together with the tinting pastes to yield different types of paints. Grundfelt-Forsius provides an example of such a system employing a polyurethane binder for a solution polymer system.

The postponement of product differentiation offers the buyer the flexibility of selecting the desired final paint, whether it be the color of the paint or the type of paint, while at the same time permitting the paint manufacturer or seller (retail or wholesale or distributor) to minimize inventories of raw materials, intermediates and final products as well as stock outages.

Despite these benefits, paint manufacturers have only been able to successfully employ the postponement in product differentiation to paint systems based on solution polymers. Paint manufacturers have not been successful in postponing product differentiation in latex polymer-based paint systems. Since the majority of paints used today are based on latex polymers, there is a need for a practical method for postponing product differentiation in a latex polymer –based

system.

It is considerably more difficult to formulate a stable paint when using latex emulsion polymers rather than solution polymers because of latex instability. Emulsion polymers are very sensitive to the solvents and surface active agents commonly found in paint formulations, such as surfactants, dispersants, rheology modifiers, and co-solvents. Solution polymers are by definition soluble in the solvent they are supplied in, and there is no thermodynamic driving force causing the polymer molecules to agglomerate or become unstable. In contrast, latex polymers contain the material in particles that are insoluble in water. These particles require considerable surface modifications to render them stable when supplied in an aqueous medium. If the surface modification is inadequate, the latex particles attach to one another forming a coagulated mass which then separates out of the latex paint.. Paint formulating with a latex system is very difficult because the surface active materials in the formulation disrupt the delicate balance of surface forces that stabilize the latex particles in a water medium.

The difference between latex (also referred to herein as "emulsion") and solution polymer systems is further explained in Temple C. Patton's book entitled *Paint Flow and Pigment Dispersion* (New York: John Wiley and Sons, Inc., 1979, pages 192-193). Here the author describes the drying processes for the two systems. The main difference lies in the time required for each to polymer reach an irreversible state. Latex polymers reach this state much faster than solution polymers and thus make paints based on latex polymers more difficult to stabilize than paints based on solution polymers. In discussing "solvent-type coatings" (which contain solution polymers), the author writes "...the liquid vehicle flows rather than deforms around the pigment particles on drying. This flow assists the compaction process as the film shrinks because of loss of volatile solvent. Although the vehicle becomes more viscous as solvent evaporates, flow persists through most of the drying cycle." As the author points out, the solution polymer is able to flow though most of the drying cycle as the solvent evaporates. This is not true for polymer emulsions. The same author notes: " ....there is a preliminary flow of the latex suspension. This takes place before the time when the latex particles are first forced to come into intimate contact because of initial water loss. However, after this relatively short but very important initial flow, pigment compaction to achieve a high critical pigment volume concentration (CPVC) is achieved mainly by plastic deformation and coalescence of the latex particles." Coalescence is the irreversible contact between latex particles. Such irreversible contact can occur in a liquid paint based on latex polymers, but not in a liquid paint based on solution polymers. Thus, paints based on latex polymers are more difficult to formulate.

There is a great need to develop a set of prepaints and a method of formulating paints based on latex polymers using sets of prepaints.

Paint formulating involves the process of selecting and admixing appropriate paint ingredients in the correct proportions to provide a paint with specific processing and handling properties, as well as a final dry paint film with the desired properties. The major ingredients of latex paint formulations are a binder, an opacifying pigment, optional pigment extenders, and water. Common optional additives include defoamers, coalescents, plasticizers, thickeners, non-thickening rheology modifiers, opacifying agents, driers, anti-skinning agents, surfactants, mildewcides, biocides and dispersants. After the latex paint is formulated and applied to a surface, the paint dries by evaporation of the water, with or without the application of heat, and the binder forms a film containing therein the pigment and the pigment extender particles, if any.

SUMMARY OF THE INVENTION

A "paint line", as used herein, includes at least two different paints which offer dried film properties which differ materially from each other in at least one observable property such as sheen, outdoor durability or color depth. A paint line may include, for example, three paints the dried films of which have different sheen levels, two paints the dried films of which have suitable interior or exterior performance, or four paints the dried films of which offer different quality or performance levels such as may be evidenced, for example, by different levels of scrub resistance.

A paint line could, more particularly, include four different paints, the dried films of which have different sheen levels, typically marketed as gloss; semi-gloss; eggshell, satin, or low lustre; and flat. The sheen is determined by the volume and type of the binder(s), pigment(s), and extender(s), if any, in the paint.

As used herein, "paint" is term used in its broadest sense which is intended to include any coating that may be applied to a surface for decorative and/or protective purposes. Specifically included are those paints employed for architectural coatings, elastomeric coatings and non-cementitious, aggregate finish coatings employed as topcoats over walls, and in an exterior insulation and finishing system (referred to as "EIFS").

In addition to the various sheen levels, paints are commonly formulated to be neutral or accent (no or very low level of opacifying pigment), untinted (white) or tinted to a wide variety of colors using different tint bases, including pastel or light tones, medium or mid-tones, and deep tones. This capability requires a paint line having as many as five paints. Also, paints are formulated for exterior or interior use. And, paints are formulated to provide certain levels of performance properties, such as may be marketed as good/standard, better and best/premium.

Paint manufacturers and retailers typically offer a range of paints, which include at least two paint lines. By "the range including at least two paint lines" herein is meant that the discrete

elected levels of the observable property defining a first paint line are combined with the discrete elected levels of the observable property defining a second paint line, etc. to define the paints in the range of paints.

To prepare a range of paints which includes four paint lines may require preparing paints four sheen levels, four tint bases, interior and exterior use, and three quality levels. For all combinations; 96 different paint formulations (4x4x2x3) may be needed. Also encompassed, however, is a range of paints in which certain of the defined paints, certain proportion, including up to as high as 10-60%, of the total number of paints, are selected to be omitted, for example, for commercial reasons or because they are not stable as defined herein. Further contemplated is a range of paints in which the observable properties of the dried paint films substantially, but not exactly, fulfill the standard definitions . For example, the sheen of a dried outdoor mid-tone gloss paint in the standard, better, and premium lines may differ by a few points without departing from the meaning of a range of paints of this invention.

Formulating the paints is complex – it is not simply a matter of mixing a few paint ingredients in different ratios. Rather, it involves the selection and mixing of different paint ingredients in different ratios depending on the type of paint desired. This requires paint manufacturers to store many different paint ingredients and change paint ingredients during manufacture depending on the specific paint type being prepared.

Furthermore, it requires those in the supply chain, especially the paint retailers, to carry a large inventory of paints in the warehouse and on the store shelves in order to offer a range of paints, such as varying sheen levels, tint bases, paints for exterior use, paints for interior use, and paints of various quality. It would be desirable to make paints, either at a relatively large-scale industrial plant or at a relatively smaller-scale, point-of-sale or point-of-use location using a limited number of paint ingredients to prepare all of these different paint formulations, thus, minimizing the number and type of paint ingredients needed to make a range of paints.

As used herein, "paint" is term used in its broadest sense which is intended to include any coating that may be applied to a surface for decorative and/or protective purposes. Specifically included are those paints employed for architectural coatings, elastomeric coatings and non-cementitious, aggregate finish coatings employed as topcoats over walls, and in an exterior insulation and finishing system (referred to as "EIFS").

As used herein, prepaints are "mutually compatible" if the paints formed by admixing the prepaints do not evidence signs of colloidal instability such as flocculation. Preferably, the paints formed from the prepaints exhibit less than 5 g of residue (e.g., gel and/or grit per liter of paint when the paint is passed through a 325 mesh screen. More preferably, the paints formed from the prepaints exhibit less than 1 g of residue per liter of paint when the paint is passed through a

325 mesh screen. If the prepaints, optional additives included to enhance specific paint properties, and colorants are fully compatible, *i.e.,* they can be blended at any ratio without inducing colloidal instability, then they can be blended in any combination falling within the formulation space needed to achieve the desired property profile in the final paint. It is sufficient, however, for the prepaints, additives included to enhance specific paint properties, and colorants to be compatible, *i.e.,* they can be blended at desired ratios without inducing colloidal instability to achieve the desired property profile in the range of paints.

In order to minimize the number of paint ingredients needed to prepare a range of paints one needs to consider the extremes of key properties required by the range of paints and formulate prepaints which are capable of being blended in various combinations to provide the key properties required, at their extreme values and at intermediate points as well. Specific properties may be improved by adding paint additives which enhance the desired property.

The above goal is achieved by employing a set of different, but mutually compatible, prepaints sufficient to formulate at least one paint line, the set comprising: (i) at least one prepaint comprising at least one opacifying pigment; (ii) at least one prepaint comprising at least one extender pigment ; and (iii) at least one prepaint comprising at least one latex polymeric binder. The number of prepaints is preferably 3-15 and wherein the prepaints are different from each other, but mutually compatible.

Also provided is a method of forming at least one paint line, which method comprises the steps of :

(a) providing a set of different, but mutually compatible, fluid prepaints sufficient to formulate at least one paint line, which set comprises (i) at least one prepaint comprising at least one opacifying pigment, (ii) at least one prepaint comprising at least one extender pigment; and (iii) at least one prepaint comprising at least one latex polymeric binder; and (iv) wherein the total number of prepaints is preferably 3-15.

(b) dispensing a predetermined amount of the prepaints into containers or applicator(s) to form the paint line.

Further provided is a method of forming a range of paints, the range comprising at least two paint lines, which method comprises the steps of:

(a) providing a set of different, but mutually compatible, fluid prepaints sufficient to formulate the range of paints, which set comprises (i) at least one prepaint comprising at least one opacifying pigment, (ii) at least one prepaint comprising at least one extender pigment; (iii) at least one prepaint comprising at least one latex polymeric binder, and (iv) at least one additional different prepaint selected from the group consisting of (i), (ii), and (iii); and

(b) dispensing a predetermined amount of each of the prepaints into containers or applicator(s) form the paints lines.

The above methods may further include the step of mixing one or more of the prepaints before, while, or after they are dispensed into the containers or before or while they are dispensed into the applicator(s) device. They also may include the step of adjusting the viscosity of the dispensed prepaints before, while, or after they are dispensed into the containers or before or while they are dispensed into the applicator(s) using a compatible thickener, water or a mixture thereof. They may further include the step of adding at least one colorant to the dispensed prepaints.

Additives that enhance the application of the paint or the final performance properties of the paint may be included in the prepaints. Such additives include aggregate and thickeners.

The above methods may be carried out at a paint manufacturing facility, a point-of-sale or a point-of-use and the providing dispensing steps may be controlled by a computer.

A set of different, but mutually compatible, prepaints sufficient to form at least one paint line useful as an elastomeric coating comprises (i) at least one fluid prepaint comprising at least one opacifying pigment; (ii) at least one fluid prepaint comprising at least one extender pigment; and (iii) at least one fluid prepaint comprising at least one latex polymeric binder having a Tg less than about 0°C.

Also provided is a method of forming at least one paint line useful as an elastomeric coating, which method comprises the steps of:

a. providing a set of prepaints comprising (i) at least one prepaint comprising at least one opacifying pigment; (ii) at least one prepaint comprising at least one extender pigment; and (iii) at least one prepaint comprising at least one latex polymeric binder; having a Tg of less than about 0°C; and

b. dispensing a predetermined amount of each of the prepaints into containers or applicator(s) to form the paint line.

A method of forming a range of paints is provided, the range comprising at least two paint lines useful as an elastomeric coating, which method comprises the steps of:

a. providing a set of prepaints sufficient to formulate the two paint lines, which set comprises (i) at least one fluid prepaint comprising at least one opacifying pigment, (ii) at least one fluid prepaint comprising at least one extender pigment, (iii) at least one fluid prepaint comprising at least one latex polymeric binder having a Tg of less than about 0°C, and (iv) at least one additional different prepaint selected from the group consisting of (i), (ii), and (iii) and wherein the prepaints are different from each other, but mutually compatible; and

b. dispensing a predetermined amount of each of the prepaints into containers or applicator(s) devices to form the range of paints.

Also provided is a set of different, but mutually compatible, fluid non-cementitious prepaints sufficient to form at least one paint line useful as a non-cementitious, aggregate finish, which set comprises: (i) at least one prepaint comprising at least one opacifying pigment; (ii) at least one prepaint comprising at least one extender pigment; (iii) at least one prepaint comprising at least one latex polymeric binder, and (iv) at least one prepaint comprising an aggregate.

Also provided is a method of forming at least one paint line useful as a non-cementitious, aggregate finish, which method comprises the steps of:

(a) providing a set of different, but mutually compatible, fluid non-cementitious prepaints comprising (i) at least one opacifying prepaint comprising at least one opacifying pigment, (ii) at least one extender prepaint comprising at least one extender pigment; (iii) at least one binder prepaint comprising at least one latex polymeric binder; and (iv) at least one prepaint comprising an aggregate; and

b. dispensing a predetermined amount of each of the prepaints into containers or applicator(s) to form the paint line.

A method of forming a range of paints is provided. The range comprises at least two paint lines useful as a non-cementitious, aggregate finishing coating. The method comprises the steps of:

(a) providing a set of different, but mutually compatible, fluid non-cementitious prepaints sufficient to formulate at least two paint lines, which set comprises (i) at least one opacifying prepaint comprising at least one opacifying pigment; (ii) at least one extender prepaint comprising at least one extender pigment; (iii) at least one binder prepaint comprising at least one latex polymeric binder; (iv) at least one prepaint comprising an aggregate; and (v) at least one different prepaint selected from the group consisting of (i), (ii), (iii), and (iv); and

b. dispensing a predetermined amount of each of the prepaints into containers or applicator(s) to form the paint lines.

If one paint line is desired, *i.e.,* if one key property is important (for example, sheen level, tint base, use paint type, or quality type), then the complete paint line can be made from one each of the opacifying, extender, and binder prepaints.

If a range of paints including two paint lines is desired, *i.e.,* if two key properties are to be varied (for example, if two will be selected from the sheen level, tint base, use type, and/or quality type), then at least one additional different opacifying, extender, or binder prepaint, depending on which key properties are to be varied must be added to the set which comprises at least one each of prepaints. "Additional different prepaints refers to prepaints which are different

from the opacifying, extender, and binder prepaints, respectively, but which otherwise meet the limitations associated with the opacifying, extender, and binder prepaints (i), (ii), and (iii).

If a range of paints including three paint lines is desired, *i.e.,* if three key properties are to be varied (for example, if three will be selected from the sheen level, tint base, use type, and/or quality type), then at least two additional different prepaints, depending on which key properties are to be varied must be added to the set which comprises at least one each of the opacifying, extender, and binder prepaints (i), (ii), and (iii).

If a range of paints including four paint lines is desired, *i.e.,* if four key properties are to be varied (for example, the sheen level, tint base, use type, and/or quality type), then at least three additional different opacifying, extender, and binder prepaints, depending on which key properties are to be varied must be added to the set which comprises at least one each of the opacifying, extender, and binder prepaints (i), (ii), and (iii).

This procedure of adding additional prepaints having the desired paint property may be used to vary as many additional key paint properties as desired.

As discussed above, "a paint line" includes two or more different paints whose dried films differ materially in at least one observable property. The paints are different from each other and must meet at least one of the following criteria:

(1) the pigment volume concentration (PVC) of the paints which are most different must differ by at least 2%; or

(2) the volume solids (VS) of the paints which are most different must differ by at least 2%.

The pigment volume concentration (PVC) is a measure of how "binder-rich" a formulation is. It is calculated using the following formula:

$$\text{PVC (\%)} = \frac{\text{volume of pigment(s) + volume extender(s)}}{\text{volume of pigment(s) + volume extender(s) + volume binder(s)}} \times 100$$

The volume solids (VS) is the dry volume of pigment(s) plus the dry volume of extender(s) plus the dry volume of binder(s). It is calculated using by the following formula:

$$\text{VS (\%)} = \frac{\text{dry volume of pigment(s) + dry volume of extender(s) + dry volume of binder(s)}}{\text{total volume of formulation}} \times 100.$$

If additives are present, their volume is not included in determining the total dry volume.

In each of the above embodiments, the prepaints are selected so that they cover a wide formulation space so that the desired final paint properties lie within the blend space defined by the prepaints at the extremes. In many cases, the prepaints themselves will not be practical paints. But, by pushing the prepaints to these extremes one can maximize the blend space

available for the set. When the prepaints, additives, and colorants are all fully compatible, they can be blended at desired ratios to achieve the desired paint line(s) and range of paints without inducing colloidal instability. It is possible to make a specific paint in the paint line without utilizing each of the prepaints available in the set of prepaints. For example, a deep tone paint does not require the use of an opacifying pigment prepaint.

This technique is similar to thc design principles used in statistical experimental design and analysis of mixture component designs; however, instead of designing a mixture space to explore the response surface within it, one is designing the boundaries of the mixture space to maximize the flexibility of the paint system. The key to success is to have mutual compatibility of the individual prepaint ingredients and prepaints across the mixture space.

Paint properties can be predicted in a number of ways. One approach is to develop response surface models of the blend space using standard Mixture Component experimental design statistical tools. These simple statistical models can then be used by a linear optimization program, by a massive grid search or by a graphical analysis tool. Another approach is to simply use empirical methods to determine which blends are needed for specific paint lines, then incorporate those simple empirical recipes in the paint making machine software.

An extension of the techniques is to have the paint machine automatically pretest certain key properties (*e.g.*, viscosity, forced dry gloss or color) and make minor adjustments during the formulating of a paint from the prepaints. Having feedback loops in the paint machine can provide more precise matching of color, gloss, and viscosity targets.

Compatible paint ingredients can be combined in the various prepaints and the paints formed from the prepaints provide the properties characteristic of the amount of ingredient used.

It is preferred that the all fluid prepaints employed in the methods of the invention have the same or similar viscosities to aid in mixing.

The water-resistance, including blister resistance, wet adhesion, and scrub resistance of the paints prepared from the prepaint sets, is expected to be improved because of the use of lower amounts of stabilizing materials such as surfactants which may be used relative to conventional formulating techniques. Further, a line of pains or a range of paints prepared using the prepaints may react more predictably to added colorants, making color matching easier and facilitating the use of software for color matching. In addition, viscosity fluctuation in the final paint formulation is expected to be reduced because of the prior equilibration of ingredients in the prepaints.

The prepaints are formulated to maximize the flexibility of paint manufacturing. Rather than purchasing individual paint ingredients, paint manufacturers and even buyers at point-of-sale and point-of-use (paint stores, paint departments, and contractors), can purchase a set of

prepaints to prepare a desired range of paints. These sets of prepaints will contain at least one each of prepaints x, y and z and possibly additional prepaints depending upon the formulating flexibility desired. Optionally, the above prepaints are mixed with an additional prepaint which includes at least one colorant, such as a colored pigment or dye.

The prepaint sets and formulating method of the present invention is not limited to the preparation of only latex paints. They may also be used to prepare any water-borne coating, or related building products which require mixing ingredients, including, architectural coatings, elastomeric wall and roof coatings, topcoats and aggregate finish layers in EIFS, sealants, caulks, mastics, adhesives and other building-related products.

DETAILED DESCRIPTION OF THE INVENTION

In one embodiment, the opacifying prepaint is a fluid titanium dioxide prepaint which includes at least one opacifying pigment, at least one dispersant, at least one thickener, and water. The dispersant(s) and the thickener(s) are compatible with the pigment(s) and with any other optional paint ingredients. The prepaint has a volume solids content of about 30% to about 70%, preferably about 35% to about 50%, and a Stormer viscosity of about 50 to about 250 KU, preferably about 60 to about 150 KU.

In an alternate embodiment, the opacifying prepaint is a fluid titanium dioxide prepaint useful for formulating a one pack, pigmented latex paint containing other paint ingredients. It includes at least one opacifying pigment, at least one dispersant, at least one thickener, at least one film-forming or nonfilm-forming polymeric binder, and water. The dispersant(s), the thickener(s), and the polymeric binder(s) are compatible with the pigment(s) and with other optional paint ingredients. The prepaint has a volume solids content of about 30% to about 70%, preferably about 35% to about 50%, a PVC of about 35% to about 100%, preferably about 50% to 100%, and a Stormer viscosity of about 50 to about 250 KU, preferably about 60 to about 150 KU. Preferably, the prepaint is stable to sedimentation, which means that the pigment does not settle out after 10 days at 25°C. Optionally, the polymeric binder is adsorbed onto the opacifying pigment.

In one embodiment, the extender prepaint is a fluid pigment extender prepaint which includes at least one mineral extender, at least one thickener, an optional polymeric binder, and water. The prepaint has a VS of about 30% to about 70%, preferably about 35% to about 65%, a PVC of about 35% to 100%, preferably about 40% to 100%, and a Stormer viscosity of about 50 to about 250 KU, preferably about 60 to about 150 KU. The prepaint ingredients are compatible with each other and with the ingredients in the other prepaints desired to be used therewith.

In one embodiment, the prepaint binder is a fluid latex polymeric binder prepaint which includes a water-borne latex polymeric binder having a Tg of about -40°C to about 70°C, preferably about -10°C to about 60°C, and water. The binder prepaint has a volume solids content of about 25% to about 70%, preferably about 30% to about 65%, and a Brookfield viscosity of less than about 100,000 centipoise, preferably about 100 to about 50,000 centipoise, at a shear rate of 1.25 reciprocal seconds. The prepaint ingredients are compatible with each other and with the ingredients of the other prepaints desired to be used therewith.

Minor amounts, *i.e.,* less than about 10% by weight, based on the total weight of the prepaint, of conventional paint additives can be included in the above prepaints. Such additives include acids, bases, defoamers, coalescents, cosolvents, mildewcides, biocides, antifreeze agents and the like. The additives must be compatible with the other paint ingredients in the prepaints.

Suitable opacifying pigments include white pigments which impart white scattering power to the paint across all visible wavelengths without a high degree of absorption. Pigment extenders are inorganic solids or opaque polymers which do not impart the primary color or hiding power to the paint although they may have secondary influences on those properties. The tint bases used for deep tone paints typically contain no or only very low levels of opacifying pigments.

Suitable opacifying pigments include titanium dioxide (TiO_2) or a combination of titanium dioxide and auxiliary hiding pigments such as synthetic polymer pigments, for example, voided latex polymer particles, zinc oxide, lead oxide, and mixtures thereof. Rutile and anatase grades of titanium dioxide are suitable for use herein. Rutile titanium dioxide is preferred. The surface of these titanium dioxides may be treated with various organic surface treatments and/or inorganic surface treatments, *e.g.,* treatment with the oxides of silica, alumina, and zirconia. Fumed titanium oxide is also useful herein.

Suitable voided latex particles have a diameter of about 100 nm to about 2,500 nm, preferably about 500 nm to about 1,100 nm and a void fraction of about 10% to about 75%. The particles have at least one void, but may have multiple voids, non-spherical voids, interconnected voids, voids having channels connected to the outside of the particles, and other structures described as vesiculated and sponge-like. Preferably, the particles have a single void. The particles have a glass transition temperature (Tg), as measured by differential scanning calorimetry at a rate of 20°C/min, of at least about 20°C, preferably at least about 50°C. The higher the Tg, the harder the particle is making it less likely to collapse. If the voided latex particles collapse, they are unable to contribute to hiding. Voided latex particles may be prepared by conventional polymerization processes known in the art, such as those disclosed in US-A-3,784,391, US-A-4,798,691, US-A-4,908,271, US-A-4,972,000, US-A-5,041,464, US-A-

5,157,084, US-A-5,216,044 and US-6,020,435, as well as Japanese Patent Applications 60/223,873, 61/62510, 61/66710, 61/86941, 62/127336, 62/156387, 01/185311, and 02/140272. Preferably, the voided latex particles are prepared according to US-A-4,427,836, US-A-4,469,825, US-A-4,594,363, US-A-4,880,842, US-A-5,494,971 and US-6,020,435.

Extender pigments useful herein include exterior and interior extender pigments optimized for the intended end use. Exterior extender pigments are not soluble in water and have a low absorption number. They are optimized for exterior durability in the particular market where the paint will be sold and they do not detract from the desired non-cracking, non-chalking, and non-dirt-retaining properties of the dried paint. They also provide volume at a low cost. Interior extender pigments are optimized for hiding, gloss, and low cost. Suitable extender pigments include barium sulfate (1-15 microns), Blanc Fixe (0.5-5 microns), calcium carbonate (0.05-35 microns), silica (0.001-14 microns), magnesium silicate (0.5-15 microns), aluminum silicate (0.2-5 microns), mica, bentonite, magnesium alumino-silicate, fumed allumina, colloidal attapulgite, synthetic amorphous sodium alumino-silicate, sodium potassium alumino-silicate, and the like.

Latex polymeric binders are polymers or prepolymers which form the primary paint film. They bind the pigment and/or extender, provide the required paint flow, and determine the gloss and hardness of the final paint film. The binders selected for the prepaints will depend upon the final use of the formulated paints. Binders suitable for exterior paints are generally suitable for interior paints, but binders suitable for interior paints may not be suitable for exterior paints.

Suitable latex polymeric binders include, but are not limited to, homopolymers, copolymers or terpolymers such as, for example, acrylic and/or methacrylic, polymers or copolymers, polyvinyl acetate, styrene-acrylic copolymers, styrene-butadiene copolymers, vinyl acetate-acrylic copolymers, ethylene-vinyl acetate copolymers, vinyl acetate-vinyl versatate copolymers, vinyl acetate-vinyl maleate copolymers, vinyl acetate-vinyl chloride-acrylic terpolymers, ethylene-vinyl acetate-acrylic terpolymer, and urethane polymers. The polymers may contain up to about 10% by weight of monomers containing functional groups, for example, but not limited to, carboxylic acid, phosphate, sulfate, sulfonate and amide groups, other monomers, and mixtures thereof. Latex polymer binders optionally incorporated in prepaints x, y, x', y', or other prepaints may be the same as or different from the latex polymeric binder of prepaint z.

Thickener is a general term used to describe any material added to a paint to modify its rheological profile. Preferred thickeners are associative thickeners. Suitable thickeners for use herein include polyvinyl alcohol (PVA), hydrophobically-modified, alkali-soluble emulsions known in the art as HASE emulsions, alkali-soluble or alkali-swellable emulsions known in the

art as ASE emulsion, hydrophobically-modified ethylene oxide-urethane polymers known in the art as HEUR thickeners; and cellulosic thickeners such as hydroxymethyl cellulose (HMC), hydroxyethyl cellulose (HEC), hydrophobically-modified hydroxy ethyl cellulose (HMHEC), sodium carboxymethyl cellulose (SCMC), sodium carboxymethyl 2-hydroxyethyl cellulose, 2-hydroxypropyl methyl cellulose, 2-hydroxyethyl methyl cellulose, 2-hydroxybutyl methyl cellulose, 2-hydroxyethyl ethyl cellulose, 2-hydoxypropyl cellulose, and the like. Also useful as thickeners are fumed silica, attapulgite clay and other types of clay, titanate chelating agents, and the like.

Suitable dispersants for use herein include non-ionic, anionic and cationic dispersants such as 2-amino 2-methyl 1-propanol (AMP), dimethyl amino ethanol (DMAE), potassium tripolyphosphate (KTPP), trisodium polyphosphate (TSPP), citric acid and other carboxylic acids, and the like. Also, suitable for use as dispersant are anionic polymers such as homopolymers and copolymers based on polycarboxylic acids, including those that have been hydrophobically- or hydrophilically-modified, *e.g.*, polyacrylic acid or polymethacrylic acid or maleic anhydride with monomers such as styrene, acrylate or methacrylate, diisobutylene, and other hydrophilic or hydrophobic comonomers as well as the salts of the aforementioned dispersants, and mixtures thereof.

Suitable defoamers include silicone-based and mineral oil-based defoamers, and the like.

Coalescents are not necessary if solvent-free latex polymer binders are used in the binder prepaints. Solvent-free binders typically have a low Tg and low minimum film-forming temperature so that they are film-forming at ambient temperatures, (about 20°C). If a coalescent is required, preferably it is incorporated in prepaint z and any other prepaints containing latex polymeric binders.

Suitable coalescents, plasticizers, and other optional solvents include ethylene glycol, propylene glycol, hexylene glycol, 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate (TEXANOL™), glycol ethers, mineral spirits, methyl carbitol, butyl carbitol, phthalates, adipates, and the like.

Suitable mildewcides and biocides include zinc oxide, isothiazolones, triazoles, and the like.

Suitable surfactants include cationic, anionic, and non-ionic surfactants.

Suitable aggregates include small (typically 40 mesh and higher), intermediate (typically 20-40 mesh), and large (typically 20 mesh and lower) aggregates such as sand, large particle size carbonates (limestone), ceramics, glass, fibers, coal, granite, talc, multicolored quartz, crushed sea shells, recycled asphalt products, fiberglass, vermiculite, perlite, XO aggregate and the like.

In another preferred embodiment, the prepaints may be used in the formulation to make

elastomeric coatings suitable for either wall or roof applications. These prepaints may be mixed in various ratios to obtain elastomeric coatings of different quality, flexibility, mildew protection, and substrate adhesion suitable for either application on walls or roofs. What distinguishing the present elastomeric coatings from typical architectural coatings is the inclusion of binders having low temperature (<0°C) flexibility and the thickness at which the elastomeric coating is applied, which is typically a dry coating thickness of 6-20 mil for wall applications and 15- 40 mil for roof applications. Low temperature flexibility is particularly desirable for elastomeric coatings that are being used over walls that may develop cracks, such as masonry walls, or roofing substrates that have a high degree of dimensional variance with climate. In addition to coating flexibility, it is desirable to have a paint line with different qualities with different degrees of low temperature flexibility, with the ability to adhere to different substrates, and with variations in appearance.

The following formulation properties influence both low temperature flexibility and coating durability:

For climates that experiences freezing temperatures through the winter, the following table shows the effect of the PVC, TiO_2 PVC, and temperature the paint quality:

Paint Description	PVC	TiO_2 PVC	Flexibility Temperature
high quality	<40	>5	<0°F
medium	<40	4-5	<0°F
medium	>40	>5	<0°F
low	>40	<4	<0°F

For a climate that has few days of freezing temperatures through the winter the following chart shows the effect of PVC, TiO_2 PVC, and temperatures on the paint quality:

Paint Description	PVC	TiO_2 PVC	Flexibility Temperature
high quality	<40	>5	<0°F
medium	<40	4-5	<32°F
medium	>40	>5	<32°F
low	>40	<4	<32°F
poor	>40	>4	<40°F

The quality of the elastomeric coating also depends on the absence or presence of zinc oxide (ZnO) in the formulation, because zinc oxide changes the mechanical properties of the coating.

Finally, the elastomeric coating may be further varied through the addition of colorants. Typically, these colorants are dry ground and made in the coating grind portion.

For elastomeric coatings, the properties which may be varied to make different elastomeric coatings which include coating flexibility, coating quality (durability), substrate adhesion, and appearance.

To vary the flexibility of the elastomeric coating, one may adjust the Tg of the binder, the PVC of the coating, and presence and level of zinc oxide. To vary the durability of the elastomeric coating, one may adjust the level of TiO_2. To vary the substrate adhesion of the elastomeric coating, one may formulate to coat a wall or a roof by varying the binder composition and level. To vary the appearance of the elastomeric coating, one may adjust the level and type of colorant. To obtain these different properties one may prepare a set of prepaints using the procedure set forth in Examples 36-41, and mix the prepaints in quantities appropriate to make elastomeric coatings that vary the above properties.

In another preferred embodiment, sets of prepaints and may be used to make non-cementitious, aggregate finish coatings suitable for application directly on a wall or as a topcoat in EIFS. The prepaints or preformulated components may be mixed in varying ratios to obtain coatings of different flexibility, quality (durability), color and texture.

The following formulation properties provide an example of how one may influence the durability of non-cementitious, aggregate finish coatings used in specifically for EIFS. Other types of aggregate finishes may have different ranges of PVC that correspond to different qualities. Therefore, the description below is only meant to be an example for aggregate finish coatings used in EIFS, and is not meant to define PVC levels used in other non-cementitious, aggregate finish coatings.

Quality Description	PVC
high quality	<72
medium	72-77
low	>77

In addition, one may define the following formulation properties that affect color strength. Other types of aggregate finishes may have different ranges of TiO_2 levels that correspond to different color strengths. Therefore, the description below is only meant to be an example for aggregate finish coatings used in EIFS, and is not meant to define TiO_2 levels used

in other aggregate finishes.

Quality Description	TiO_2 PVC(%)
white, pastels	> 1.5
midtones	0.5-1.5
deep tones	< 0.5

Finally, one may also define the aggregate size and amount which affect coating's texture.

Description	Small Aggregate	Large Aggregate
fine	>90%	≤ 10%
coarse	≤ 90%	> 10%

Further variations in the performance of aggregate finish can be achieved by varying the flexibility or T_g of the binder.

In the formulation of non-cementitious, aggregate finish coatings, one may vary the PVC level, the TiO_2 level, the aggregate ratio, and the binder T_g to make different coatings.

To differentiate based on the flexibility of non-cementitious, aggregate finish coatings, one may adjust the Tg. To differentiate based on the durability of non-cementitious, binder's aggregate finish coatings, one may adjust the PVC. To differentiate based on the color of the non-cementitious, aggregate finish coatings, one may adjust the level of TiO_2 and the type and level of colorant. To differentiate based on the texture of the non-cementitious, aggregate finish coatings, one may adjust the size and level of the large aggregate and ratio of the large aggregates to small aggregates. To obtain coating that have these different properties one may prepare the prepaint set as set forth in Examples 54-58 a set of prepaints which can be formulated into and mix the prepaints in appropriate quantities to make non-cementitious, aggregate finish coatings that vary in the properties.

In the following examples, all ranges are inclusive and the minimums and maximums of the nested ranges are combinable.

Test Procedures

The Stormer viscosity of the prepaints is measured using ASTM method D562. The Brookfield viscosity of the binder prepaints and final paints is measured using spindle #4 of a Brookfield viscometer at 6 rpm. The ICI viscosity of the prepaints and paints is measured using ASTM method D3205-77.

EXAMPLES

Example 1

This example describes the preparation of a white prepaint which was prepared by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment – Titanium Dioxide Slurry (76.5% solids) (Ti-Pure™ R-746 -- DuPont)	1152.25
Dispersant (Tamol™ 1124 – Rohm and Haas)	7.06
Defoamer (Drewplus™ L-475)	1.00
Binder Acrylic (50% solids – Tg 28 °C (Rhoplex™ SG-10M – Rohm and Haas)	166.32
Opacifer – Voided Latex Particles (Ropaque™ OP-96 – Rohm and Haas)	151.80
Coalescent (Texanol™)	12.95
Rheology Modifier (Acrysol™ RM-8W – Rohm and Haas)	12.76
Base – Ammonia (28%)	1.65

The prepaint was prepared using a laboratory mixer having a 45° pitch stirring blade. The water, dispersant, and defoamer, were combined and mixed. The titanium dioxide slurry was slowly added and the mixture was stirred for 15-20 minutes. The binder, coalescent, rheology modifier, ammonia, and additional water if necessary were then added.

The resulting prepaint had a total volume of 100 gallons, total weight of 1,505.8 lbs., total PVC of 80.0%, volume solids of 44.0%, weight solids of 67.1%, density of 15.058 lbs./gallon, 0.40% dispersant on pigment solids, and 10.0% coalescent on latex solids. Its initial and equilibrated Stormer viscosities were 88 and 90 KU. Its initial and equilibrated pH values were 8.8 and 8.6.

Example 2

This example describes the preparation of an exterior pigment extender prepaint. It was prepared as above by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment – Nephilene Syenite (7.5μ) (Minex™ 4)	784.30
Dispersant (Tamol™ 1124 - Rohm and Haas)	7.84
Defoamer (Drewplus™ L-475)	2.00
Binder Acrylic (53.5% solids – Tg 18 °C) (Rhoplex™ ML-200 - Rohm and Haas)	157.49
Coalescent (Texanol™)	5.90
Rheology Modifier (Acrysol™ RM-8W - Rohm and Haas)	2.55
Water	368.86

The resulting prepaint had a total volume of 100 gallons, total weight of 1,328.9 lbs., total PVC of 80.0%, volume solids of 45.0%, weight solids of 65.4%, density of 13.29 lbs./gallon, 0.50% total dispersant on pigment solids and 7.0% total coalescent on binder solids. The initial and equilibrated Stormer viscosities were 90 and 93. The initial and equilibrated pH values were 8.9 and 8.7.

Example 3

This example describes the preparation of an interior pigment extender prepaint which was prepared as described above by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment – Calcium Carbonate (12μ) (Omyacarb™ 12)	405.67
Pigment – Calcium Carbonate (3.2μ) (Vicron™ 15-15)	203.59
Pigment – Aluminum Silicate (1.4μ) (Optiwhite™)	165.41
Dispersant	7.75

(Tamol™ 1124 -Rohm and Haas)	
Defoamer	1.00
(Drewplus™ L-475)	
Binder – Vinyl Acetate/Acrylic (55% solids – Tg 14 °C)	157.61
(RES™ 3803- Rohm and Haas)	
Coalescent (Texanol™)	6.07
Rheology Modifier – HEUR (Acrysol™ RM-2020-NPR)	17.53
Base – Ammonia (28%)	0.87
Water	356.59

The resulting prepaint had a total volume of 100 gallons, total weight of 1,322.1 lbs., total PVC of 80%, volume solids of 45%, weight solids of 65.15%, density of 13.2210 lbs./gallon, 0.50% dispersant on pigment solids, and 7.00% coalescent on binder solids, Its initial and equilibrated Stormer viscosities were 94 and 97. Its initial and equilibrated pH values were both 9.2.

Example 4

This example describes a vinyl acetate/acrylic latex polymer binder prepaint which was prepared as described above except that the binder, defoamer, coalescent, ammonia, water, and rheology modifier were combined and mixed. The ingredients and amounts were as follows:

Ingredient	Amount (lbs./100 gallons)
Defoamer	8.00
(Drewplus™ L-475)	
Binder – Vinyl Acetate/Acrylic (55% solids – Tg 14 °C)	788.06
(RES™ 3803- Rohm and Haas)	
Coalescent	30.34
(Texanol™)	
Rheology Modifier –HEUR	3.02
(Acrysol™ SCT-275 - Rohm and Haas)	
Base – Ammonia (28%)	1.95
Water	60.08

The resulting prepaint had a total volume of 100 gallons, total weight of 891.5 lbs., volume solids of 45.0%, a weight solids of 48.6%, a density of 8.91 lbs./gallon and 7.0% coalescent on binder solids. Its initial and equilibrated Stormer viscosities were 88 and 90. Its

initial and equilibrated pH values were 8.6 and 8.4. Its equilibrated Brookfield viscosity should be less than 10,000 cps.

Example 5

This example describes a flat acrylic binder prepaint which was prepared as above by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Defoamer (Drewplus™ L-475)	8.00
Binder – Acrylic (53.5% solids – Tg 18°C) (Rhoplex™ ML-200 - Rohm and Haas)	769.96
Coalescent (Texanol™)	28.83
Rheology Modifier (HEUR) (Acrysol™ RM-8W - Rohm and Haas)	1.15
Base – Ammonia (28%)	.57
Solvent – Propylene Glycol	60.00
Water	12.84

The resulting prepaint had a total volume of 100 gallons, total weight of 881.4 lbs., volume solids of 44.0%, weight solids of 46.7%, density of 8.81 lbs./gallon, and 7.0% coalescent on binder solids. . Its initial and equilibrated Stormer viscosities were 91 and 89. Its initial and final pH values were both 8.9/9.0. Its equilibrated Brookfield viscosity should be less than 10,000 cps.

Example 6

This example describes a gloss acrylic binder prepaint which was prepared as described above by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Defoamer (Drewplus™ L-475)	8.00
Binder – Acrylic (50% solids – Tg 28°C) (Rhoplex™ SG-10M - Rohm and Haas)	737.08
Coalescent (Texanol™)	36.85

Rheology Modifier – HEUR (Acrysol™ RM 8W - Rohm and Haas)	11.62
Base – Ammonia (28%)	.35
Solvent – Propylene Glycol	60.00
Water	21.26

The resulting prepaint had a total volume of 100 gallons, a total weight of 875.2 lbs., volume solids of 39.0%, a weight solids of 42.11%, a density of 8.75 lbs./gallon and 10.0% coalescent on binder solids. . Its initial and equilibrated Stormer viscosities were 97 and 98. The initial and equilibrated pH values were 9.0. Its equilibrated Brookfield viscosity should be less than 10,000 cps.

Example 7

This example describes the preparation of a white pigment prepaint including a solvent-free acrylic binder and without the use of a coalescent. The ingredients are mixed as described in Example 1 using the ingredients and amounts set out below.

Ingredient	Amount (lbs./100 gallons)
Pigment –Titanium Dioxide (Ti-Pure™ R-706 - DuPont)	734.49
Opacifier – Voided Latex Particles (Ropaque™ OP-96 - Rohm and Haas)	164.43
Dispersant (Tamol™ 731 - Rohm and Haas)	29.38
Non-ionic Surfactant (Triton™ CF-10)	2.00
Biocide (Kathon™ LX (1.5%) - Rohm and Haas)	2.00
Defoamer (Foamaster™ VL)	3.00
Binder – Acrylic copolymer (43.5% solids – Tg -2 °C) (Rhoplex™ SF-012 - Rohm and Haas)	165.96
Rheology Modifier – HEUR (Acrysol™ RM-825 - Rohm and Haas)	5.00
Rheology Modifier – HEUR (Acrysol™ RM-2020 NPR - Rohm and Haas)	42.69

Base – Ammonia (28%)	.49
Water	250.13

The resulting prepaint should have a total volume of 100 gallons, total weight of 1,401.3 lbs., total PVC of 80.0%, volume solids of 40.0%, weight solids of 61.1% density of 14.01 lbs./gallon, and 1.0% dispersant on pigment solids. Its estimated Stormer viscosity is 102 KU. Its pH should be 8.5 - 9.0.

Example 8

This example describes the preparation of an exterior pigment extender prepaint with a solvent-free acrylic binder without the use of a coalescent. The ingredients are mixed as described in Example 1 using the ingredient amounts set out below.

Ingredient	Amount (lbs./100 gallons)
Pigment – Nephiline Syenite (7.5μ) (Minex™ 4)	697.16
Dispersant (Tamol™ 731 - Rohm and Haas)	27.89
Non-ionic Surfactant (Triton™ CF-10)	2.00
Biocide (Kathon™ LX (1.5%) - Rohm and Haas)	2.00
Defoamer (Foamaster™ VL)	3.00
Binder – Acrylic (46.5% solids – Tg 1 °C) (Primal™ SF-015 Rohm and Haas)	160.84
Rheology Modifier HEUR (Acrysol™ RM-2020 NPR - Rohm and Haas)	101.80
Water	284.47

The resulting prepaint should have a total volume of 100 gallons, total weight of 1,280.9 lbs., total PVC of 80.0%, volume solids of 40.0%, weight solids of 60.27%, density of 12.81 lbs./gallon, and 1.0% dispersant on pigment solids. Its Stormer viscosity should be 95 KU. Its pH should be 8.5 – 9.0. If not, the pH is adjusted as described in Example 7.

Example 9

This example describes the preparation of an interior pigment extender prepaint including a solvent-free vinyl acetate/acrylic binder without the use of a coalescent. The ingredients are mixed as described in Example 1 using the ingredient amounts set out below.

Ingredient	Amount (lbs./100 gallons)
Pigment – Calcium Carbonate (3.2μ) (Snowflake™)	451.20
Pigment – Aluminum Silicate (1.4μ) (Optiwhite™)	220.37
Dispersant (Tamol™ 1254 - Rohm and Haas)	19.19
Non-ionic Surfactant (Triton™ CF-10)	2.00
Biocide (Kathon™ LX (1.5%))	2.00
Defoamer (Foamaster™ VL)	3.00
Binder – Vinyl Acetate/Acrylic (55% solids) (Rovace™ 9900)	139.86
Rheology Modifier HASE (Acrysol™ DR-3)	9.00
Base -- Ammonia (28%)	0.86
Water	405.69

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,254.9 lbs., total PVC of 80.0%, volume solids of 40.0%, weight solids of 59.65%, density of 12.55 lbs./gallon, and 1.0% dispersant on pigment solids. Its Stormer viscosity should be 95 KU. Its pH should be 8.5 - 9.0.

Example 10

This example describes the preparation of a vinyl acetate/acrylic latex polymer binder prepaint including a solvent-free vinyl acetate/acrylic binder without a coalescent. The ingredients are mixed as described in Example 4 using the ingredient amounts set out below.

Ingredient	Amount (lbs./100 gallons)
Binder – Vinyl Acetate/Acrylic (55% solids – Tg 10 °C) (Rovace™ 9900 - Rohm and Haas)	699.25
Defoamer (Foamaster™ VL)	3.00
Rheology Modifier HASE (Acrysol™ DR-3 - Rohm and Haas)	12.96
Base –Ammonia (28%)	2.90
Water	405.69

The resulting prepaint should have a total volume of 100 gallons, total weight of 885.2 lbs., volume solids of 40.0%, a weight solids of 43.5%, and density of 8.85 lbs./gallon. Its Stormer viscosity should be 99 KU. Its Brookfield viscosity should be less than 10,000 cps. Its pH should be 8.5-9.0.

Example 11

This example describes the preparation of a flat latex polymer binder prepaint including a solvent-free acrylic binder and no coalescent. The ingredients are mixed as described in Example 4 using the ingredient amounts set out below.

Ingredient	Amount (lbs./100 gallons)
Defoamer (Foamaster™ VL)	8.00
Binder – Acrylic Copolymer (43.5% solids – Tg -2 °C) (Rhoplex™ SF –012 - Rohm and Haas)	723.77
Rheology Modifier – HEUR (Acrysol™ RM –2020 NPR - Rohm and Haas)	3.00
Water	133.75

The resulting prepaint should have a total volume of 100 gallons, a total weight of 868.5 lbs., volume solids of 36.0%, weight solids of 38.8% and density of 8.69 lbs./gallon. Its Stormer viscosity should be 99 KU. Its Brookfield viscosity should be less than 10,000 cps. Its pH should be 8.5 - 9.0 and, if not, it is adjusted as discussed above.

Example 12

This example describes the preparation of a gloss latex polymer binder prepaint using a solvent-free acrylic binder and no coalescent. The ingredients are mixed as described in Example 4 using the ingredient amounts set out below.

Ingredient	Amount (lbs./100 gallons)
Defoamer (Foamaster™ VL)	8.00
Binder – Acrylic Copolymer (43.5% solids – Tg -2 °C) (Rhoplex™ SF-012 - Rohm and Haas)	767.57
Rheology Modifier – HEUR (Acrysol™ RM-2020 NPR - Rohm and Haas)	23.00
Water	61.62

The resulting prepaint should have a total volume of 100.0 gallons, total weight of 860.4 lbs., volume solids of 37.0%, a weight solids of 38.8% and a density of 8.60 lbs./gallon. Its Stormer viscosity should be 99 KU. Its Brookfield viscosity should be less than 10,000 cps. Its pH should be 8.5 - 9.0 and, if not, it should be adjusted as described above.

Example 13

This example describes the preparation of a white pigment prepaint using an interior gloss grade titanium dioxide which was prepared by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment –Titanium Dioxide (Ti-Pure™ R-900 – DuPont)	734.49
Opacifier – Voided Latex Particles (30.5% solids) (Ropaque™ Ultra-Rohm and Haas)	164.43
Dispersant (Tamol™ 1254 - Rohm and Haas)	20.99
Non-ionic Surfactant (Triton™ CF-10)	2.00
Biocide (Kathon™ LX (1.5%) - Rohm and Haas)	2.00
Defoamer (Foamaster™ VL – source)	3.00
Binder – Vinyl Acetate/Acrylic (55% solids – Tg 14 °C) (RES 3083 – Rohm and Haas)	140.10

Coalescent	11.37
(Texanol™)	
Rheology Modifier - HASE	11.47
(Acrysol™ DR-3)	
Base – Ammonia (28%)	1.20
Solvent – Propylene Glycol	50.00
Water	264.38

The resulting prepaint had a total volume of 100 gallons, a total weight of 1405.4 lbs., total PVC of 80%, volume solids of 40%, weight solids of 61.25%, density of 14.05 lbs./gallon, 1.0% dispersant on pigment solids, and 9.0% coalescent on binder solids. The Stormer viscosity was 100 KU. The Brookfield viscosity was 15,300 cps. The pH was 8.8.

Example 14

This example describes the preparation of a white pigment prepaint using an exterior gloss grade titanium dioxide which was prepared by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment –Titanium Dioxide	734.56
(Ti-Pure™ R-706-DuPont)	
Opacifier – Voided Latex Particles (30.5% solids)	164.44
(Ropaque™ Ultra-Rohm and Haas)	
Dispersant	29.38
(Tamol™ 731- Rohm and Haas))	
Non-ionic Surfactant	2.00
(Triton™ CF-10)	
Biocide	2.00
(Kathon™ LX (1.5%) - Rohm and Haas)	
Defoamer	3.00
(Foamaster™ VL)	
Binder – Acrylic Copolymer (50% solids – Tg 28 °C)	151.20
(Rhoplex™ SG-10 - Rohm and Haas)	
Coalescent	12.49
(Texanol™)	
Rheology Modifier)HEUR	42.69
(Acrysol™ RM-2020 NPR - Rohm and Haas)	

Base – Ammonia (28%)	.49
Solvent – Propylene Glycol	50.00
Water	211.34

The resulting prepaint had a total volume of 100 gallons, a total weight of 1403.6 lbs., total PVC of 80%, volume solids of 40%, weight solids of 61.2%, density of 14.04 lbs./gallon, 1.0% dispersant on pigment solids, and 9.0% coalescent on binder solids. The Stormer viscosity was 100 KU. The Brookfield viscosity was 4,010 cps. The pH was 8.8.

Example 15

This example describes the preparation of an exterior pigment extender prepaint. It was prepared by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment – Nephilene Syenite (7.5μ) (Minex™ 4)	697.16
Dispersant (Tamol™ 731 –Rohm and Haas)	27.89
Non-ionic Surfactant (Triton™ CF-10)	2.00
Biocide Kathon™ LX (1.5%) -- Rohm and Haas)	2.00
Defoamer (Foamaster™ VL)	3.00
Binder – Acrylic (53.5% solids – Tg 18 °C) (Rhoplex™ Multilobe 200 – Rohm and Haas)	139.98
Coalescent (Texanol™)	5.24
Rheology Modifier – HEUR (Acrysol™ RM – 2020 – Rohm and Haas)	101.80
Solvent –Propylene Glycol	50.00
Water	254.40

The resulting prepaint had a total volume of 100 gallons, a total weight of 1281.5 lbs., total PVC of 80.0%, volume solids of 40.0%, weight solids of 60.3%, density of 12.81 lbs./gallon, 1.0% dispersant on pigment solids, and 7.0% total coalescent on binder solids. The Stormer viscosity was 96 KU. The Brookfield viscosity was 7,210 cps. The pH was 9.8.

Example 16

This example describes the preparation of an interior pigment extender prepaint. It was prepared by combining the following ingredients:

Ingredients	Amounts (lbs./100 gallons)
Pigment – Calcium Carbonate (5 μ) (Snowflake™)	451.20
Pigment – Aluminum Silicate (1.4 μ) (Optiwhite™)	220.37
Dispersant (Tamol™ 1254 – Rohm and Haas)	19.19
Non-ionic Surfactant (Triton™ CF-10)	2.00
Biocide (Kalthon™ LX (1.5%) – Rohm and Haas)	2.00
Defoamer (Foamaster™ VL)	3.00
Binder – Vinyl Acetate/Acrylic (55% solids – Tg 14°C) (RES 3083 – Rohm and Haas)	140.10
Coalescent (Texanol™)	6.93
Rheology Modifier – HASE (Acrysol™ DR-3 – Rohm and Haas)	11.00
Base – Ammonia (28%)	0.86
Solvent – Propylene Glycol	50.00
Water	348.48

The resulting prepaint had a total volume of 100 gallons, a total weight of 1255.1 lbs., total PVC of 80.0%, volume solids of 40.0%, a weight solids of 59.7%, density of 12.55 lbs./gallon, 1.0% dispersant on pigment solids, and 9.0% total coalescent on binder solids. The Stormer viscosity was 102 KU. The Brookfield viscosity was 3,410 cps. The pH was 8.9.

Example 17

This describes the preparation of a vinyl acetate/acrylic binder prepaint. It was prepared by combining the following ingredients:

Ingredients	Amounts (lbs./100 gallons)
Defoamer (Foamaster™ VL)	3.00
Binder – Vinyl Acetate/Acrylic (55% solids – Tg 14 °C) (RES 3083 – Rohm and Haas)	700.48
Coalescent (Texanol™)	34.67
Rheology Modifier – HASE (Acrysol™ DR-3 – Rohm and Haas)	12.96
Base – Ammonia (28%)	2.90
Solvent – Propylene Glycol	50.00
Water	83.48

The resulting prepaint had a total volume of 100 gallons, a total weight of 887.5 lbs., volume solids of 40.0%, a weight solids of 43.4%, a density of 8.88 lbs./gallon, 9.0% coalescent on binder solids. Its Stormer viscosity was 98.0. The Brookfield viscosity was 13,600 cps. Its pH was 9.0.

Example 18

This example describes the preparation of a flat acrylic binder prepaint. It was prepared by combining the following ingredients:

Ingredients	Amounts (lbs./100 gallons)
Defoamer (Foamaster™ VL)	3.00
Binder – Acrylic (53.5% solids – Tg 18 °C) (Rhoplex™ Multilobe 200 – Rohm and Haas)	699.92
Coalescent (Texanol™)	26.21
Rheology Modifier – HEUR (Acrysol™ RM-2020 NPR – Rohm and Haas)	1.44
Base – Ammonia (28%)	0.35
Solvent – Propylene Glycol	50.00
Water	96.59

The resulting prepaint had a total volume of 100 gallons, a total weight of 877.5 lbs., volume solids of 40.0%, weight solids of 42.7%, density of 8.78 lbs./gallon, 7.0% coalescent on

binder solids. Its Stormer viscosity was 94.0. The Brookfield viscosity was 4,900 cps. Its pH was 8.9.

Example 19

This example describes the preparation of a gloss acrylic binder prepaint. It was prepared by combining the following ingredients:

Ingredients	Amounts (lbs./100 gallons)
Defoamer (Foamaster™ VL)	3.00
Binder – Acrylic Copolymer (50% solids – Tg 28 °C) (Rhoplex™ SG-10M – Rohm and Haas)	755.99
Coalescent (Texanol™)	37.80
Rheology Modifier – HEUR (Acrysol™ RM-2020 NPR – Rohm and Haas)	11.62
Base – Ammonia (28%)	0.35
Solvent – Propylene Glycol	50.00
Water	17.68

The resulting prepaint had a total volume of 100 gallons, a total weight of 876.4 lbs., volume solids of 40.0%, weight solids of 43.1%, a density of 8.76 lbs./gallon, 10.0% coalescent on binder solids. Its Stormer viscosity was 96. The Brookfield viscosity was 5,000 cps. Its pH was 8.8.

Example 20

This example describes the preparation of a white prepaint by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment – Titanium Dioxide (Ti-Pure™ R-706 -- DuPont)	1001.66
Dispersant (Tamol™ 1124 – Rohm and Haas)	20.03
Defoamer (Drewplus™ L-475)	1.00
Binder Acrylic (50% solids – Tg 28 °C (Rhoplex™ SG – 10M – Rohm and Haas)	189.00

Opacifer – Voided Latex Particles (Ropaque™ OP-96 – Rohm and Haas)	172.50
Coalescent (Texanol™)	14.72
Rheology Modifier (Acrysol™ RM-8W – Rohm and Haas)	2.00
Base – Ammonia (28%)	1.65
Water	200.44

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,603.0 lbs., total PVC of 80.0%, volume solids of 50.0%, weight solids of 71.7%, a density of 16.03 lbs./gallon, 1% dispersant on pigment solids, and 10.0% coalescent on latex solids.

Example 21

This example describes the preparation of a white pigment prepaint with pigmented vesiculated polymeric bead. The pigmented vesiculated polymeric bead has a particle size of 12.5 microns, approximately 7% (s/s) titanium dioxide, and a void volume of approximately 77%. The ingredients are mixed as described in Example 1 using the ingredient amounts set out below.

Ingredient	Amount (lbs./100 gallons)
Pigmented Vesiculated Polymeric Bead (Spindrift™ 25)	733.00
Dispersant (Tamol™ 1124 - Rohm and Haas)	0
Defoamer (Drewplus™ L-475)	2.00
Binder Acrylic (53.5% solids – Tg 18°C) (Rhoplex™ ML-200 - Rohm and Haas)	154
Coalescent (Texanol™)	5.90
Rheology Modifier (Acrysol™ RM-8W - Rohm and Haas)	2.55
Water	15.89

The resulting prepaint should have a total volume of 100 gallons, total weight of 913.3 lbs., total PVC of 80.0%, volume solids of 44.0%, weight solids of 28.28%, and density of 9.13

lbs./gallon. Its Stormer viscosity should be 91 KU. Its pH should be 8.5 – 9.0. If not, the pH is adjusted as described in Example 7.

Example 22

This example describes the preparation of an exterior pigment extender prepaint by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment – Nephilene Syenite (7.5µ) (Minex™ 4)	871.44
Dispersant (Tamol™ 1124 - Rohm and Haas)	8.71
Defoamer (Drewplus™ L-475)	2.00
Binder Acrylic (60.5% solids – Tg 16 °C) (Rhoplex™ AC-264 - Rohm and Haas)	154.74
Coalescent (Texanol™)	6.56
Rheology Modifier (Acrysol™ RM-8W - Rohm and Haas)	3.00
Water	326.08

The resulting prepaint should have a total volume of 100 gallons, total weight of 1,382.5 lbs., total PVC of 80.0%, volume solids of 50.0%, weight solids of 69.8%, density of 13.82 lbs./gallon, 0.5% dispersant on pigment solids, and 7.0% coalescent on latex solids.

Example 23

This example describes the preparation of an interior pigment extender prepaint by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Pigment – Calcium Carbonate (12µ) (Omyacarb™ 12)	450.67
Pigment – Calcium Carbonate (3.2µ) (Vicron™ 15-15)	226.17
Pigment – Aluminum Silicate (1.4µ) (Optiwhite™)	183.76
Dispersant	8.61

(Tamol™ 1124 -Rohm and Haas)	
Defoamer	1.00
(Drewplus™ L-475)	
Binder – Vinyl Acetate/Acrylic (55% solids – Tg 14 °C)	175.09
(RES 3803)	
Coalescent (Texanol™)	6.74
Rheology Modifier – HEUR (Acrysol™ SCT-275)	15.00
Base – Ammonia (28%)	0.87
Water	308.13

The resulting prepaint should have a total volume of 100 gallons, total weight of 1376.0 lbs., total PVC of 80.0%, volume solids of 50.0%, weight solids of 69.5%, density of 13.76 lbs./gallon, 0.5% dispersant on pigment solids, and 7.0% coalescent on latex solids.

Example 24

This example describes the preparation of a vinyl acetate/acrylic binder prepaint by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Defoamer	2.00
(Drewplus™ L-475)	
Binder – Vinyl Acetate/Acrylic (55% solids – Tg 14°C)	875.62
(RES 3803)	
Coalescent	13.00
(Texanol™)	
Rheology Modifier –HEUR	9.29
(Acrysol™ SCT-275 - Rohm and Haas)	

The resulting prepaint should have a total volume of 100 gallons, total weight of 899.9 lbs., a total PVC of 0.0%, volume solids of 50.0%, weight solids of 53.2%, density of 8.99 lbs./gallon, and 10.0% coalescent on latex solids.

Example 25

This example describes the preparation of a flat acrylic prepaint by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Defoamer	8.00
(Drewplus™ L-475)	

Binder Acrylic (60.5% solids – Tg 16 °C)	773.67
(Rhoplex™ AC-264 - Rohm and Haas)	
Coalescent	23.40
(Texanol™)	
Rheology Modifier (HEUR)	13
(Acrysol™ RM-8W - Rohm and Haas)	
Base – Ammonia (28%)	0.50
Solvent – Propylene Glycol	60.00
Water	1.84

The resulting prepaint should have a total volume of 100 gallons, total weight of 880.4 lbs., total PVC of 0.0%, volume solids of 50.0%, weight solids of 53.2%, density of 8.80 lbs./gallon, and 5.0% coalescent on latex solids.

Example 26

This example describes the preparation of a gloss acrylic binder prepaint by combining the following ingredients:

Ingredient	Amount (lbs./100 gallons)
Binder – Acrylic (50% solids – Tg 28°C)	836.85
(Rhoplex™ SG-10M - Rohm and Haas)	
Coalescent	41.84
(Texanol™)	

The resulting prepaint should have a total volume of 100 gallons, a total weight of 878.7 lbs., total PVC of 0.0%, volume solids of 44.3%, weight solids of 47.4%, density of 8.78 lbs./gallon, and 10.0% coalescent on latex solids.

Example 27

This example describes the preparation of nine exterior flat latex paints of varying quality and tone using different combinations of the white pigment prepaint of Example 14, the exterior pigment extender prepaint of Example 15, the vinyl acetate–acrylic (PVA) binder prepaint of Example 17, and the flat acrylic binder prepaint of Example 18. The paints are formulated by adding the white pigment prepaint and exterior pigment extender prepaint to the binder prepaints and mixing well.

Paint No.	PVC (%)	Volume Solids (%)	Prepaints (wt.) White (Ex 14)	Exterior Extender (Ex 15)	PVA Binder (Ex 17)	Flat Acrylic Binder (Ex 18)	Water (wt.)
27-1	45.0	35.0	395.53	269.60	—	335.92	104.34
27-2	50.0	30.0	317.19	311.10	—	246.80	208.68
27-3	50.0	30.0	263.69	359.94	197.64	51.38	208.68
27-4	42.5	35.0	197.77	415.12	—	359.92	104.34
27-5	47.5	30.0	158.60	425.86	—	267.37	208.68
27-6	47.5	30.0	131.84	450.28	214.11	55.67	208.68
27-7	40.0	35.0	—	560.64	—	383.91	104.34
27-8	45.0	30.0	—	540.62	—	287.93	208.68
27-9	45.0	30.0	—	540.62	230.58	59.95	208.68

Paints 27-1, 27-4 and 27-7 are premium quality light, mid and deep tone paints; paints 27-2, 27-5 and 27-8 are first quality light, mid and deep tone paints; and paints 27-3, 27-6 and 27-9 are second quality light, mid and deep tone paints.

Example 28

This example describes the preparation of nine exterior satin latex paints of varying quality and tone using different combinations of the white pigment prepaint and exterior pigment extender prepaint of Examples 14 and 15, respectively, and the vinyl acetate/acrylic binder (PVA) and flat acrylic binder prepaints of Examples 17 and 18. The paints are formulated as described above.

Paint No.	PVC (%)	Volume Solids (%)	Prepaints (wt.) White (Ex 14)	Exterior Extender (Ex 15)	PVA Binder (Ex 17)	Flat Acrylic Binder (Ex 18)	Water (wt.)
28-1	35.0	35.0	395.53	129.44	—	431.90	104.34
28-2	37.0	30.0	351.59	123.51	—	353.75	208.68
28-3	40.0	26.0	263.69	175.73	228.35	59.41	292.15
28-4	32.5	36.0	197.77	287.98	—	468.92	83.47
28-5	34.5	30.0	175.75	253.98	—	374.31	208.68
28-6	37.5	26.0	131.84	270.07	242.63	63.12	292.12
28-7	30.0	36.0	—	432.50	—	493.60	83.47

28-8	32.0	30.0	—	384.44	—	394.88	208.68
28-9	35.0	26.0	—	364.42	256.87	66.86	292.15

Paints 28-1, 28-4 and 28-7 are premium quality light, mid and deep tone paints; paints 28-2, 28-5 and 28-8 are first quality light, mid and deep tone paints; and paints 28-3, 28-6 and 28-9 are second quality light, mid and deep tone paints.

Example 29

This example describes the preparation of nine exterior gloss latex paints of using different combinations of the white pigment and exterior extender prepaints of Examples 14 and 15 and vinyl acetate/acrylic binder (PVA) and gloss acrylic binder prepaints of Examples 17 and 19. The paints are formulated as described above.

Paint			Prepaints (wt.)			Water
No.	PVC (%)	Volume Solids (%)	White (Ex 14)	PVA Binder (Ex 17)	Gloss Acrylic Binder (Ex 19)	(wt.)
29-1	26.0	35.0	435.66	—	494.85	104.34
29-2	30.0	30.0	460.50	—	413.60	166.94
29-3	30.0	30.0	429.93	304.15	88.51	208.68
29-4	13.0	35.0	217.83	—	630.87	104.34
29-5	15.0	30.0	230.25	—	557.38	166.94
29-6	15.0	30.0	214.96	409.14	119.06	208.68
29-7	—	35.0	—	—	766.89	104.34
29-8	—	30.0	—	—	701.15	166.94
29-9	—	30.0	—	514.12	149.61	208.68

Paints 29-1, 29-4 and 29-7 are premium quality light, mid and deep tone paints; paints 29-2, 29-5 and 29-8 are first quality light, mid and deep tone paints; and paints 29-3, 29-6 and 29-9 are second quality light, mid and deep tone paints.

Example 30

This example describes the preparation of nine interior flat latex paints using different combinations of the white pigment and interior extender prepaints of Examples 14 and 16 and the vinyl acetate/acrylic (PVA) and flat acrylic binder prepaints of Examples 17 and 18. The paints are formulated as described above.

Paint			Prepaints (wt.)				Water
No.	PVC (%)	Volume Solids (%)	White (Ex 14)	Interior Extender (Ex 16)	PVA Binder (Ex 17)	Flat Acrylic Binder (Ex 18)	(wt.)
30-1	50.0	30.0	351.59	273.94	197.64	51.38	208.68
30-2	60.0	30.0	263.69	470.21	166.40	—	208.68
30-3	75.0	25.0	128.02	620.95	34.67	—	313.02
30-4	47.5	15.0	175.79	401.73	214.11	55.67	208.68
30-5	57.5	30.0	131.84	558.69	187.20	—	208.68
30-6	72.5	25.0	64.01	653.67	52.00	—	313.02
30-7	45.0	30.0	—	529.51	230.58	59.95	208.68
30-8	55.0	30.0	—	647.18	208.01	—	208.68
30-9	70.0	25.0	—	686.40	69.34	—	313.02

Paints 30-1, 30-4 and 30-7 are premium quality light, mid and deep tone paints; paints 30-2, 30-5 and 30-8 are first quality light, mid and deep tone paints; and paints 30-3, 30-6 and 30-9 are second quality light, mid and deep tone paints.

Example 31

This example describes the preparation of nine interior satin latex paints using the white pigment and interior extender prepaints of Examples 14 and 16 and the vinyl acetate/acrylic (PVA) and flat acrylic binder prepaints of Examples 17 and 18. The paints are formulated as described above.

Paint			Prepaints (wt.)				Water
No.	PVC (%)	Volume Solids (%)	White (Ex 14)	Interior Extender (Ex 16)	PVA Binder (Ex 17)	Flat Acrylic Binder (Ex 18)	(wt.)
31-1	35.0	36.0	395.53	140.51	355.75	92.49	83.47
31-2	37.0	30.0	351.59	120.98	357.77	—	208.68
31-3	40.0	20.0	263.69	172.12	288.43	—	292.15
31-4	32.5	36.0	197.77	282.06	375.51	97.96	83.47
31-5	34.5	30.0	175.79	248.76	378.57	—	208.68
31-6	37.5	26.0	131.84	264.52	306.46	—	292.15
31-7	30.0	36.0	—	423.61	395.28	102.77	83.47
31-8	32.0	30.0	—	376.54	399.37	—	208.68
31-9	35.0	26.0	—	356.93	324.49	—	292.15

Paints 31-1, 31-4 and 31-7 are premium quality light, mid and deep tone paints; paints 31-2, 31-5 and 31-8 are first quality light, mid and deep tone paints; and paints 31-3, 31-6 and 31-9 are second quality light, mid and deep tone paints.

Example 32

This example describes the preparation of nine interior gloss latex paints using the white pigment prepaint of Example 14 and the vinyl acetate/acrylic (PVA) and gloss acrylic binder prepaints of Examples 17 and 19. The paints are formulated as described above.

Paint			Prepaints (wt.)			Water
No.	PVC (%)	Volume Solids (%)	White (Ex 14)	PVA Binder (Ex 17)	Gloss Acrylic Binder (Ex 19)	(wt.)
32-1	26.0	35.0	435.66	—	494.85	104.34
32-2	30.0	38.0	429.93	304.15	88.51	208.68
32-3	30.1	28.0	403.18	366.31	—	250.42
32-4	13.0	35.0	217.83	—	630.87	104.34
32-5	15.0	30.0	214.96	409.14	119.06	208.68
32-6	15.0	28.0	201.59	493.78	—	250.42
32-7	—	35.0	—	—	766.89	104.34
32-8	—	30.0	—	514.12	149.61	208.68
32-9	—	28.0	—	621.24	—	250.42

Paints 32-1, 32-4 and 32-7 are premium quality light, mid and deep tone paints; paints 32-2, 32-5 and 32-8 are first quality light, mid and deep tone paints; and paints 32-3, 32-6 and 32-9 are second quality light, mid and deep tone paints.

Example 33

This example describes the preparation of a latex paint useful for architectural coatings which can be prepared using the white pigment prepaint of Example 20, the exterior pigment extender of Example 22, and the flat acrylic binder prepaint of Example 25. The paint is formulated as described above.

Paint		Prepaints (wt.)			Water
PVC (%)	Volume Solids (%)	White (Ex 20)	Exterior Extender (Ex 21)	Flat Acrylic Binder (Ex 24)	(wt.)
35	48	331.27	294.95	475.42	33.39

The resulting paint should be a premium paint having a satin finish and a light tone.

Example 34

This example describes the preparation of a low solids interior flat paint using the white pigment prepaint of Example 20, the interior pigment extender of Example 23, and the vinyl acetate/acrylic (PVA) binder prepaint of Example 24.

Paint		Prepaints (wt.)			Water
PVC (%)	Volume Solids (%)	White (Ex 20)	Interior Extender (Ex 22)	PVA Binder (Ex 23)	(wt.)
75	15	107.22	294.97	16.87	584.31

Example 35

This example describes the preparation of paints using the prepaints of Examples 1 to 6. The paints were prepared by mixing the pigment prepaint(s) with the binder prepaint(s), then

adding the thickeners, water and colorants and mixing well. The Stormer viscosity, ICI viscosity, and pH were the equilibrated measured values.

Part A – Exterior Flat Paints (Best and Good)

Paint No.	Prepaint (lbs.) White Pigment (Ex 1)	Exterior Extender Pigment (Ex 2)	PVA Binder (Ex 4)	Flat Acrylic Binder (Ex 6)	Thickener (lbs.) Acrysol SCT-275	Acrysol RM 2020 NPR	Water (lbs.)	Colorant (lbs.)
35-1[a]	353.86	278.01	—	306.97	10.40	14.00	149.68	—
35-2[b]	235.96	351.50	177.30	46.09	26.40	11.20	237.06	—
35-3[a]	—	516.00	—	351.00	32.68	—	146.45	162
35-4[b]	—	500.00	206.58	53.70	48.48	—	237.06	162

a. Best light tone and deep tone paints
b. Good light tone and deep tone paints

Measured Equilibrated Values				Calculated Properties					
Paint No.	Stormer Viscosity (KU)	ICI Viscosity (cp)	pH	Volume[A] (gallons)	Weight[A] (lbs.)	PVC (%)	Volume Solids (%)	Weight Solids (%)	Density (b/gal)
35-1[c]	102	1.15	8.76	100	1112.92	45.05	35.08	50.66	11.13
35-2[d]	101	0.87	8.30	100	1085.52	50.04	30.05	45.68	10.86
35-3[e]	110	1.90	9.02	100	1046.13	39.94	35.00	47.92	10.46
35-4[f]	121	1.80	8.70	100	1045.82	45.09	29.76	43.25	10.36

c. There was 0.44% dispersant based on dry pigment and 7.48% coalescent based on dry polymer.
d. There was 0.46% dispersant based on dry pigment and 7.40% coalescent based on dry polymer.
e. There was 0.50% dispersant based on dry pigment and 7.00% coalescent based on dry polymer.
f. There was 0.50% dispersant based on dry pigment and 7.00% coalescent based on dry polymer.

Part B – Exterior Satin Paint (Better)

Paint No.	Prepaint (lbs.) White Pigment (Ex 1)	Exterior Extender Pigment (Ex 2)	PVA Binder (Ex 4)	Flat Acrylic Binder (Ex 6)	Thickener (lbs.) Acrysol SCT-275	Acrysol RM 2020 NPR	Water (lbs.)	Colorant (lbs.)
35-5	314.56	137.00	—	323.00	17.82	17.58	234.22	—

Paint No.	Measured Equilibrated Values: Stormer Viscosity (KU)	ICI Viscosity (cp)	pH	Calculated Properties: Volume (gallons)	Weight (lbs.)	PVC (%)	Volume Solids (%)	Weight Solids (%)	Density (b/gal)
35-5	104	1.19	8.95	100.00	1044.18	36.94	29.96	43.26	10.44

There was 0.43% dispersant based on dry pigment and 7.43% coalescent based on dry polymer.

Part C – Exterior Semigloss (Best and Good)

Paint No.	Prepaint (lbs.) White Pigment (Ex 1)	Exterior Extender Pigment (Ex 2)	PVA Binder (Ex 4)	Gloss Acrylic Binder (Ex 5)	Thickener (lbs.) Acrysol SCT-275	Acrysol RM 2020 NPR	Water (lbs.)	Colorant (lbs.)
35-6[a]	389.40	—	—	530.37	—	15.20	98.44	—
35-7[b]	383.98	—	85.33	294.89	22.40	26.00	217.67	—

a. Best
b. Good

Measured Equilibrated Values: Paint No.	Stormer Viscosity (KU)	ICI Viscosity (cp)	pH	Calculated Properties: Volume (gallons)	Weight (lbs.)	PVC (%)	Volume Solids (%)	Weight Solids (%)	Density (b/gal)
35-6[c]	99	1.19	8.54	100.00	1033.41	26.00	35.00	46.91	10.33
35-7[d]	102	1.05	8.20	100.00	1030.27	30.00	29.90	42.43	10.30

c. There was a 0.40% dispersant based on dry pigment solids and a 10.00% coalescent base on dry polymer
d. There was a 0.40% dispersant based on dry pigment solids and a 7.97% coalescent base on dry polymer

Part D – Interior Flat

Paint No.	Prepaint (lbs.) White Pigment (Ex 1)	Interior Extender Pigment (Ex 3)	PVA Binder (Ex 4)	Flat Acrylic Binder (Ex 5)	Thickener (lbs.) Acrysol SCT-275	Acrysol RM 2020 NPR	Water (lbs.)	Colorant (lbs.)
35-8[a]	314.56	280.69	177.31	46.09	24.00	20.80	230.22	—
35-9	115.95	590.05	30.04	—	34.60	—	336.19	—
35-10[a]	—	496.07	206.55	53.67	41.92	—	236.60	162

35-11	—	643.99	62.04	—	51.36	—	320.17	162

a. Paints 35-8 and 35-10 were best light and deep tone paints.
Paints 35-9 and 35-11 were good light and deep tone paints.

Measured Equilibrated Values				Calculated Properties					
Paint No.	Stormer Viscosity (KU)	ICI Viscosity (cp)	pH	Volume (gallons)	Weight (lbs.)	PVC (%)	Volume Solids (%)	Weight Solids (%)	Density (b/gal)
35-8	99	1.05	8.45	100.00	1093.67	50.00	30.00	45.88	10.94
35-9	84	0.70	8.50	100.00	1106.83	75.15	24.99	43.08	11.07
35-10	120	1.90	8.60	100.00	1034.81	45.04	29.99	43.36	10.35
35-11	108	1.88	8.80	100.00	1077.56	70.00	25.05	41.74	10.78

The percentage dispersant on dry pigment was 0.45%, 0.48%, 0.50%, and 0.50% for paint nos. 34-8 to 34-11, respectively. The percentages of Coalescent was 7.53%, 47%, 7.00% and 7.00% for paint nos. 34-8 to 34-11, respectively.

Part E – Interior Satin Paint

	Prepaint (lbs.)				Thickener (lbs.)			
Paint No.	White Pigment (Ex 1)	Interior Extender Pigment (Ex 3)	PVA Binder (Ex 4)	Flat Acrylic Binder (Ex 5)	Acrysol SCT-275	Acrysol RM 2020 NPR	Water (lbs.)	Colorant (lbs.)
35-12	314.56	138.00	319.00	—	24.96	21.40	229.76	—

The paint was a better light tone paint.

Measured Equilibrated Values				Calculated Properties					
Paint No.	Stormer Viscosity	ICI Viscosity	pH	Volume	Weight	PVC	Volume Solids	Weight Solids	Density

	(KU)	(cp)		(gallons)	(lbs.)	(%)	(%)	(%)	(b/gal)
35-12	93	0.91	8.37	100.00	1047.68	37.05	29.99	43.54	10.48

The dispersant in dry pigment was 0.43%.

The coalescent in dry polymer was 7.42%.

Part F – Semi-Gloss Paint

Paint No.	Prepaint (lbs.) White Pigment (Ex 1)	Interior Extender Pigment (Ex 3)	PVA Binder (Ex 4)	Gloss Acrylic Binder (Ex 6)	Thickener (lbs.) Acrysol SCT-275	Acrysol RM 2020 NPR	Water (lbs.)	Colorant (lbs.)
35-13	383.98	—	294.89	85.33	22.40	26.00	217.67	—
35-14	359.89	—	347.58	—	28.80	28.00	255.70	—

Paint nos. 35-13 were better and good light tone paints.

Measured Equilibrated Values				Calculated Properties					
Paint No.	Stormer Viscosity (KU)	ICI Viscosity (cp)	pH	Volume (gallons)	Weight (lbs.)	PVC (%)	Volume Solids (%)	Weight Solids (%)	Density (b/gal)
35-13	102	1.05	8.20	100.00	1030.27	30.01	29.91	42.43	10.30
35-14	101	1.19	7.90	100.00	1019.97	30.02	28.02	40.22	10.20

The dispersant was 0.40% on dry pigment for paints 35-13 and 35-14.

The coalescents were 7.97% and 7.47%, respectively for paints 35-13 and 35-14.

Example 36

This example describes the preparation of a white opacifying pigment prepaint for use in

an elastomeric coating. The prepaint can be prepared by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (50.5% solids, T_g = -16°C Rhoplex® 2438 - Rohm and Haas)	177.11
Water	257.90
Dispersant (Tamol® 165A - Rohm and Haas)	49.24
Defoamer (Nopco NXZ)	12.44
Base - Ammonia (28%)	3.94
Coalescent (Texanol)	2.68
Rheology Modifier (Acrysol® SCT-275)	5.00
Pigment - Titanium Dioxide (Ti-Pure R-960 - DuPont)	1292.48

The prepaint is prepared using a high speed disperser. The water, dispersant, acrylic binder, defoamer, base, and rheology modifier are combined and mixed briefly and at low speed and then the dry pigment is added. After all the dry pigment is added, the mixture should be dispersed at high speed for 15-20 minutes, as is known to those skilled in the art.

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,800.80 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 76.74%, a density of 18.008 lbs./gal., 0.80% dispersant on pigment solids, and 3.0% coalescent on latex solids.

<u>Example 37</u>

This example describes the preparation of a white opacifying pigment prepaint containing zinc oxide for use in an elastomeric coating. The prepaint can be prepared as above by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (50.5% solids, T_g = -16°C Rhoplex® 2438 - Rohm and Haas)	177.11
Water	278.10
Dispersant (Tamol® 2001 - Rohm and Haas)	26.99
Surfactant (Triton® X-405 - Union Carbide)	10.00
Defoamer (Nopco NXZ)	5.00
Base - Ammonia (28%)	3.94
Coalescent (Texanol)	2.68
Rheology Modifier (Acrysol® SCT-275)	5.00
Pigment - Zinc Oxide (XX-503 - Zinc Corporation of America)	283.26
Pigment - Titanium Dioxide (Ti-Pure R-706 - DuPont)	1133.50

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,925.58 lbs., a total PVC of 80.00%, a titanium dioxide PVC of 67.90%, a volume solids of 50.00%, a weight solids of 78.22%, a density of 19.2558 lbs./gal., 0.80% dispersant on pigment solids, and 3.0% coalescent on latex solids.

Example 38

This example describes the preparation of an extender pigment prepaint for use in an elastomeric coating. The prepaint is prepared as described above by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)

Water	295.80
Dispersant (Tamol 731A - Rohm and Haas)	10.82
Defoamer (Nopco NXZ)	13.36
Base - Ammonia (28%)	6.68
Coalescent (Texanol)	1.79
Rheology Modifier (Natrosol 250 HR)	1.00
Binder Acrylic (50.5% solids, T_g = -16°C, Rhoplex 2438 - Rohm and Haas)	177.11
Pigment - Calcium Carbonate (Duramite)	901.50

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,408.05 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 70.38%, a density of 14.0805 lbs./gal., 0.30% dispersant on pigment solids, and 2.0% coalescent on latex solids.

Example 39

This example describes the preparation of a low T_g acrylic binder prepaint with good low temperature flexibility. The prepaint is prepared using a laboratory mixer having a 45° pitch stirring blade.

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (50.5% solids, T_g = -16°C Rhoplex® 2438 - Rohm and Haas)	814.71
Defoamer (Nopco NXZ)	1.33
Rheology Modifier (Natrosol 250 HR)	5.32

Solvent - Propylene Glycol	26.62
Base - Ammonia (28%)	2.66
Coalescent (Texanol)	8.23
Water	6.06

The resulting prepaint should have a total volume of 100 gallons, a total weight of 864.93 lbs., a volume solids of 46.00%, a weight solids of 47.57%, a density of 8.6493 lbs./gal., and 2.0% coalescent on latex solids.

Example 40

This example describes the preparation of a mid-range T_g stryene/acrylic binder prepaint with low temperature flexibility only down to -5°C. The prepaint is prepared using a laboratory mixer having a 45° pitch stirring blade.

Ingredient	Amount (lbs./100 gal.)
Binder Styrene/Acrylic (55.0% solids, T_g = -5°C Rhoplex® 2019R - Rohm and Haas)	803.91
Defoamer (Nopco NXZ)	1.33
Rheology Modifier (Natrosol 250 HR)	5.32
Solvent – Propylene Glycol	26.62
Base - Ammonia (28%)	2.66
Coalescent (Texanol)	8.84
Water	10.99

The resulting prepaint should have a total volume of 100 gallons, a total weight of 859.69

lbs., a volume solids of 50.00%, a weight solids of 51.43%, a density of 8.5969 lbs./gal., and 2.0% coalescent on latex solids.

Example 41

This example describes the preparation of a high T_g (14°C) 100% acrylic binder prepaint with poor low temperature flexibility. The prepaint is prepared using a laboratory mixer having a 45° pitch stirring blade.

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (53.5% solids, T_g = 14°C Multilobe™ 200 - Rohm and Haas)	822.40
Defoamer (Nopco NXZ)	1.33
Rheology Modifier (Natrosol 250 HR)	5.32
Solvent - Propylene Glycol	26.62
Base - Ammonia (28%)	2.66
Coalescent (Texanol)	26.40
Water	0.36

The resulting prepaint should have a total volume of 100 gallons, a total weight of 885.11 lbs., a volume solids of 47.00%, a weight solids of 49.71%, a density of 8.8511 lbs./gal., and 6.0% coalescent on latex solids.

Example 42

This example describes the preparation of 11 elastomeric wall coating formulations of varying quality and mildew resistance, using different combinations of the white pigment prepaints of Examples 36 and 37, the extender prepaints of Example 38, and the binder prepaints of Examples 39, 40 and 41. The paints are formulated by adding the white pigment prepaint and extender prepaint to the binder prepaints and mixing well.

The prepaint amounts mixed together are those given below. All weights are in lbs., the total volume of each elastomeric coating is 100 gallons, formulated to 45% volume solids.

	Weight of Example Prepaints							
Paint	36	37	38	39	40	41	Water	Total
42-1	70.9	0.0	419.8	528.8	0.0	0.0	42.4	1061.9
42-2	0.0	89.3	409.9	528.8	0.0	0.0	42.4	1070.5
42-3	70.9	0.0	657.4	370.2	0.0	0.0	54.6	1153.1
42-4	0.0	89.3	647.5	370.2	0.0	0.0	54.6	1161.6
42-5	131.7	0.0	372.3	528.8	0.0	0.0	42.4	1075.2
42-6	0.0	165.9	353.9	528.8	0.0	0.0	42.4	1091.0
42-7	131.7	0.0	609.9	370.2	0.0	0.0	54.6	1166.3
42-8	0.0	165.9	591.5	370.2	0.0	0.0	54.6	1182.2
42-9	70.9	0.0	419.8	0.0	483.6	0.0	83.0	1057.3
42-10	0.0	89.3	647.5	0.0	338.5	0.0	83.0	1158.3
42-11	70.9	0.0	657.4	227.5	0.0	141.6	58.7	1014.5

The expected PVC, TiO2 level, low temperature flexibility, and quality of the resulting elastomeric coatings are shown below.

Paint	PVC	ZnO presence	TiO_2 PVC	Flex	Quality
42-1	30	no	3.5	0°F	medium
42-2	30	yes	3.5	0°F	medium
42-3	45	no	3.5	0°F	low
42-4	45	yes	3.5	0°F	low
42-5	30	no	6.5	0°F	high
42-6	30	yes	6.5	0°F	high
42-7	45	no	6.5	0°F	medium
42-8	45	yes	6.5	0°F	medium
42-9	30	no	3.5	20°F	medium
42-10	45	yes	3.5	20°F	low
42-11	45	no	3.5	40°F	poor

The elastomeric coating preparations shown above represent a range of qualities that

depend upon the durability and the flexibility at low temperature. These examples are not intended to be limiting. For instance, all the pigment and extender prepaints can be formulated with or without binders, and the binders may have a higher T_g than the one used in these examples. In addition, the extender prepaint is not meant to limited to the use of calcium carbonate, but to show an example that could also include other commonly used extenders such as, clays, silicas, magnesium silicates, and the like.

Elastomeric coatings for use for roofs can be differentiated in the same manner as elastomeric coatings for walls, with two additional variations, the use of functional extenders such as aluminum trihydrate to promote flame retardency, and enhanced adhesion to specific roofing substrates. The examples that follow are intended to show the capabilities of the prepaint concept when applied to elastomeric roof coatings, and are not intended to limit.

Example 43

This example describes the preparation of a white pigment prepaint. The prepaint is prepared by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (55.0% solids, T_g = -29°C Rhoplex® EC-1791 - Rohm and Haas)	159.75
Water	268.95
Dispersant (Tamol® 165A - Rohm and Haas)	49.24
Defoamer (Nopco NXZ)	12.44
Base – Ammonia (28%)	3.94
Coalescent (Texanol)	2.64
Rheology Modifier (Acrysol® SCT-275)	10.00
Pigment – Titanium Dioxide (Ti-Pure R-960 - DuPont)	1292.48

The prepaint can be prepared using a high speed disperser. The water, dispersant, acrylic

binder, defoamer, base, and rheology modifier are combined and mixed briefly at low speed and then the dry pigment is added. After all the dry pigment is added, the mixture is dispersed at high speed, for 15-20 minutes as is known to those skilled in the art.

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,799.45 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 76.71%, a density of 17.9945 lbs./gal., 0.80% dispersant on pigment solids, and 3.0% coalescent on latex solids.

Example 44

This example describes the preparation of a white pigment prepaint for use in preparing coatings which have good adhesion to asphalt roofing materials. The prepaint is prepared by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (55.0% solids, T_g = -8°C Lipacryl® MB-3640 - Rohm and Haas)	160.69
Water	268.12
Dispersant (Tamol® 165A - Rohm and Haas)	49.24
Defoamer (Nopco NXZ)	12.44
Base – Ammonia (28%)	3.94
Coalescent (Texanol)	2.65
Rheology Modifier (Acrysol® SCT-275)	10.00
Pigment – Titanium Dioxide (Ti-Pure R-960 – DuPont)	1292.48

The prepaint is prepared using a high speed disperser, as illustrated in Example 43. The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,799.56 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 76.73%, a density of 17.9956 lbs./gal., 0.80% dispersant on pigment solids, and 3.0% coalescent on latex solids. This

prepared is designed to work best in coatings for asphalt substrates.

Example 45

This example describes the preparation of a white opacifying prepaint containing zinc oxide. The prepaint is prepared as above by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (55.0% solids, T_g = -29°C Rhoplex® EC-1791 - Rohm and Haas)	159.75
Water	272.67
Dispersant (Tamol® 731A - Rohm and Haas)	44.09
Surfactant (Triton® X-405 - Union Carbide)	10.00
Defoamer (Nopco NXZ)	5.00
Base – Ammonia (28%)	3.94
Coalescent (Texanol)	2.64
Rheology Modifier (Acrysol® SCT-275)	12.00
Pigment - Zinc Oxide (XX-503 - Zinc Corporation of America)	275.47
Pigment – Titanium Dioxide (Ti-Pure R-960 – DuPont)	1102.32

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,887.88 lbs., a total PVC of 80.00%, a titanium oxide PVC of 68.23%, a volume solids of 50.00%, a weight solids of 77.63%, a density of 18.8788 lbs./gal., 0.80% dispersant on pigment solids, and 3.0% coalescent on latex solids.

Example 46

This example describes the preparation of an extender pigment prepaint. The prepaint is prepared as above by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Water	310.92
Dispersant (Tamol 731A - Rohm and Haas)	10.82
Defoamer (Nopco NXZ)	13.36
Base – Ammonia (28%)	6.68
Coalescent (Texanol)	1.76
Rheology Modifier (Natrosol 250 HR)	2.00
Binder Acrylic (55.0% solids, T_g = -29°C, Rhoplex® EC-1791 - Rohm and Haas)	159.75
Pigment - Calcium Carbonate (Duramite)	901.50

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,406.78 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 70.33%, a density of 14.0678 lbs./gal., 0.30% dispersant on pigment solids, and 2.0% coalescent on latex solids.

Example 47

This example describes the preparation of an extender pigment prepaint for use in preparing coatings which have good adhesion to asphalt roofing materials. The prepaint is prepared as above by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Water	310.09

Dispersant (Tamol 731A - Rohm and Haas)	10.82
Defoamer (Nopco NXZ)	13.36
Base – Ammonia (28%)	6.68
Coalescent (Texanol)	1.77
Rheology Modifier (Natrosol 250 HR)	2.00
Binder Acrylic (55.0% solids, T_g = -8°C, Lipacryl® MB-3640 - Rohm and Haas)	160.69
Pigment - Calcium Carbonate (Duramite)	901.50

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,406.90 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 70.36%, a density of 14.0690 lbs./gal., 0.30% dispersant on pigment solids, and 2.0% coalescent on latex solids.

__Example 48__

This example describes the preparation of an extender pigment prepaint using aluminum trihydrate, which is known to impart flame retardant properties. It is prepared as described above by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Water	311.61
Dispersant (Tamol 731A - Rohm and Haas)	9.70
Defoamer (Nopco NXZ)	13.36
Base – Ammonia (28%)	6.68

Coalescent (Texanol)	1.76
Rheology Modifier (Natrosol 250 HR)	2.00
Binder Acrylic (55.0% solids, T_g = -29°C, Rhoplex® EC-1791 - Rohm and Haas)	159.75
Pigment – Aluminum Trihydrate (Solem SB-432 Huber)	807.94

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,312.79 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 68.24%, a density of 13.1279 lbs./gal., 0.30% dispersant on pigment solids, and 2.0% coalescent on latex solids.

Example 49

This example describes the preparation of low T_g acrylic binder prepaint which should have good low temperature flexibility and good adhesion to a variety of roofing substrates. The prepaint is prepared using a laboratory mixer having a 45° pitch stirring blade.

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (55.0% solids, T_g = -29°C Rhoplex® EC-1791 - Rohm and Haas)	798.75
Defoamer (Nopco NXZ)	1.33
Rheology Modifier (Natrosol 250 HR)	5.32
Solvent – Propylene Glycol	26.62
Base - Ammonia (28%)	2.66
Coalescent (Texanol)	8.79

Water	16.45

The resulting prepaint should have a total volume of 100 gallons, a total weight of 859.93 lbs., a volume solids of 50.00%, a weight solids of 51.09%, a density of 8.5993 lbs./gal., and 2.0% coalescent on latex solids.

Example 50

This example describes the preparation of a mid-range T_g acrylic binder prepaint which should have good adhesion to asphalt roofing materials. The prepaint prepared using a laboratory mixer having a 45° pitch stirring blade.

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (55.0% solids, T_g = -8°C Lipacryl® MB-3640 - Rohm and Haas)	803.45
Defoamer (Nopco NXZ)	1.33
Rheology Modifier (Natrosol 250 HR)	5.32
Solvent – Propylene Glycol	26.62
Base - Ammonia (28%)	2.66
Coalescent (Texanol)	8.84
Water	12.29

The resulting prepaint should have a total volume of 100 gallons, a total weight of 860.52 lbs., a volume solids of 50.00%, a weight solids of 51.35%, a density of 8.6052 lbs./gal., and 2.0% coalescent on latex solids.

Example 51

This example describes the preparation of a tan pigment prepaint with zinc oxide. The prepaint is prepared as in example 46 by combining the following ingredients.

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (55.0% solids, T_g = -29°C Rhoplex® EC-1791 - Rohm and Haas)	143.78
Water	307.35
Dispersant (Tamol® 731A - Rohm and Haas)	30.07
Surfactant (Triton® X-405 - Union Carbide)	10.00
Defoamer (Nopco NXZ)	5.00
Base – Ammonia (28%)	3.94
Coalescent (Texanol)	2.37
Rheology Modifier (Acrysol® SCT-275)	40.00
Pigment - Zinc Oxide (XX-503 - Zinc Corporation of America)	480.33
Pigment - Tan Iron Oxide (Mapico 422)	1023.06

The resulting prepaint should have a total volume of 100 gallons, a total weight of 2,045.89 lbs., a total PVC of 80.00%, a volume solids of 45.00%, a weight solids of 77.35%, a density of 20.4589 lbs./gal., 0.50% dispersant on pigment solids, and 3.0% coalescent on latex solids.

Example 52

This example describes the preparation of an extender pigment prepaint using crystalline silica. Silica extenders are known to provide good durability and abrasion resistance. It is prepared as above by combining the following ingredients:

Ingredient	Amount (lbs./100 gal.)
Water	296.22
Dispersant (Tamol® 731A - Rohm and Haas)	26.54
Defoamer (Nopco NXZ)	13.36
Base – Ammonia (28%)	6.68
Coalescent (Texanol)	1.76
Thickener (Natrosol 250 HR)	2.00
Binder Acrylic (55.0% solids, T_g = -29°C Rhoplex® EC-1791 - Rohm and Haas)	159.75
Silica Extender (Silver Bond B)	884.81

The resulting prepaint should have a total volume of 100 gallons, a total weight of 1,391.11 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 69.92%, a density of 13.9111 lbs./gal., 0.75% dispersant on pigment solids, and 2.0% coalescent on latex solids.

Example 53

This example describes the preparation of 15 elastomeric roof coating formulations of varying quality, flexibility, adhesion and flame retardency. The coatings are formulated using different combinations of the white prepaints of Examples 43, 44, and 45, the non-white pigment prepaint of Example 51, the extender prepaints of Examples 46, 47, 48, and 52, and the binder prepaints of Examples 40, 49 and 50. The paints are formulated by adding the pigment prepaint and extender prepaint to the binder prepaints and mixing well. The amounts mixed are those cited below. All weights are in lbs., and the total volume of each elastomeric coating is 100 gallons. The volume solids is 45%.

	Weight in lbs. of example prepaints												
Paint	43	44	45	51	46	47	48	52	40	49	50	Water	Total
53-1	70.9	--	--	--	419.4	--	--	--	--	483.7	--	83	1057.0
53-2	--	--	87.2	--	409.8	--	--	--	--	483.7	--	83	1063.7
53-3	70.9	--	--	--	656.8	--	--	--	--	338.6	--	83	1149.2
53-4	--	--	87.2	--	647.2	--	--	--	--	338.6	--	83	1156.0
53-5	131.6	--	--	--	371.9	--	--	--	--	483.7	--	83	1070.2
53-6	--	--	161.9	--	354.2	--	--	--	--	483.7	--	83	1082.7
53-7	131.6	--	--	--	609.3	--	--	--	--	338.6	--	83	1162.5
53-8	--	--	161.9	--	591.6	--	--	--	--	338.6	--	83	1175.0
53-9	70.9	--	--	--	--	--	391.4	--	--	483.7	--	83	1028.9
53-10	--	--	88.9	--	--	--	647.8	--	--	338.5	--	83	1158.2
53-11	91.1	--	--	--	403.6	--	--	--	483.6	--	--	83	1061.2
53-12	--	--	112.1	--	628.7	--	--	--	338.5	--	--	83	1162.2
53-13	--	131.6	--	--	--	530.2	--	--	--	--	387.2	83	1132.1
53-14	131.6	--	--	--	530.2		--	--	387.2	--	--	83	1132.0
53-15	--	--	--	179.0	--	--	--	548.0	--	368.0	--	76	1171.0

The expected PVC, TiO2 level, low temperature flexibility, extender type, and presence of special adhesion and quality of the resulting elastomeric coating mixtures are shown below.

Paint	PVC	ZnO	TiO2 PVC	Color	Extender	Flex Temp	Special adhesion	Quality
53-1	30	no	3.5	white	$CaCO_3$	-15°F	variety	medium
53-2	30	yes	3.5	white	$CaCO_3$	-15°F	variety	medium
53-3	45	no	3.5	white	$CaCO_3$	-15°F	variety	low
53-4	45	yes	3.5	white	$CaCO_3$	-15°F	variety	low
53-5	30	no	6.5	white	$CaCO_3$	-15°F	variety	high
53-6	30	yes	6.5	white	$CaCO_3$	-15°F	variety	high
53-7	45	no	6.5	white	$CaCO_3$	-15°F	variety	medium
53-8	45	yes	6.5	white	$CaCO_3$	-15°F	variety	medium
53-9	30	no	3.5	white	ATH	-15°F	variety	medium
53-10	45	yes	3.5	white	ATH	-15°F	variety	low

53-11	30	no	4.5	white	$CaCO_3$	20°F	variety	medium
53-12	45	yes	4.5	white	$CaCO_3$	20°F	variety	low
53-13	40	no	6.5	white	$CaCO_3$	20°F	asphalt	medium
53-14	40	no	6.5	white	$CaCO_3$	20°F	asphalt blend	medium
53-15	42	yes	0	tan	silica	-15°F	variety	medium

The elastomeric coatings prepared shown above represent a range of qualities that depend upon the durability and the flexibility of the coating at low temperature. Different extender prepaints are used to promote flame retardency in the dried coatings. Included are prepaints prepared using dry ground colorants and no TiO_2 to develop tinted paints. These examples are not intended to be limiting. For instance, all the pigment and extender prepaints can be formulated with or without binders, and the binders may have a higher T_g than the one used in the example. In addition, the extender prepaint is not meant to be limited to calcium carbonate, but to show an example that could also include other commonly used extenders such as, clays, silicas, magnesium silicates, etc.

Example 54

This example describes the preparation of a white pigment prepaint/preformulated component.

Ingredient	Amount (lbs./100 gal.)
Water	275.83
Solvent - Propylene Glycol	50.00
Dispersant (Tamol® 731A - Rohm and Haas)	26.71
Defoamer (Nopco NXZ)	1.50
Surfactant(Triton CF-10)	1.00
Pigment - Titanium Dioxide (Ti-Pure R-902 - DuPont)	1335.56
Base (Ammonia - 28%)	4.00

Defoamer (Nopco NXZ)	1.50
Thickener (Acrysol® RM-2020 NPR - Rohm and Haas)	50.00
Water	93.45

The water, glycol, defoamer, dispersant and surfactant are combined and mixed briefly at low speed. The dry pigment is then added. After all the dry pigment is added, the mixture is mixed at high shear for 15-20 minutes as is known to those skilled in the art.

The resulting white pigment prepaint/preformulation should have a total volume of 100 gallons, a total weight of 1,839.55 lbs., a total PVC of 100.00%, a volume solids of 40.12%, a weight solids of 72.60%, a density of 18.4495 lbs./gal., and 0.50% dispersant on pigment solids.

Example 55

This example describes the preparation of a small particle size extender prepaint/preformulated component:

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (46.5% solids, $T_g = 17°C$ Rhoplex® EI-2000 - Rohm and Haas)	201.32
Solvent - Propylene Glycol	5.00
Dispersant (Tamol® 731A - Rohm and Haas)	10.42
Defoamer (Nopco NXZ)	2.00
Thickener #1 (Attagel 50)	27.96
Small particle size extender (Minex 4)	840.53
Coalescent (Texanol)	3.28
Base (Ammonia - 28%)	2.00

Water	283.42
Thickener #2 (Acrysol® ASE-60 - Rohm and Haas)	4.00

The water, acrylic binder, defoamer, base, and glycol are combined and mixed briefly at low speed. The dry extender is then added. After all the dry extender is added, the mixture is mixed at high shear for 15-20 minutes as is known to those skilled in the art.

The resulting small particle size extender prepaint/preformulation should have a total volume of 100 gallons, a total weight of 1,379.93 lbs., a total PVC of 80.00%, a volume solids of 50.00%, a weight solids of 69.72%, a density of 13.7993 lbs./gal., 0.30% dispersant on pigment solids, and 3.50% coalescent on latex solids.

Example 56

This example describes the preparation of binder prepaint/preformulation. It is prepared using a laboratory mixer having a 45° pitch stirring blade.

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (46.5% solids, Tg = 17°C Rhoplex® EI-2000 - Rohm and Haas)	805.28
Defoamer (Nopco NXZ)	1.33
Thickener (Acrysol® ASE-60 - Rohm and Haas)	20.00
Solvent – Propylene Glycol	10.00
Base – Ammonia (28%)	2.66
Coalescent (Texanol)	13.11
Water	21.92

The resulting binder prepaint/preformulation package should have a total volume of 100

gallons, a total weight of 874.31 lbs., a volume solids of 40.00%, a weight solids of 42.83%, a density of 8.7431 lbs./gal., and 3.50% coalescent on latex solids.

Example 57

This example describes the preparation of binder prepaint/preformulation which should have good low temperature flexibility. It is prepared using a laboratory mixer having a 45° pitch stirring blade.

Ingredient	Amount (lbs./100 gal.)
Binder Acrylic (61% solids, Tg =-29°C Rhoplex® EC-2848 - Rohm and Haas)	584.20
Defoamer (Nopco NXZ)	1.33
Thickener (Acrysol® ASE-60 - Rohm and Haas)	20.00
Solvent – Propylene Glycol	10.00
Base – Ammonia (28%)	2.66
Coalescent (Texanol)	12.47
Water	226.92

The resulting preformulated binder package should have a total volume of 100 gallons, a total weight of 857.59 lbs., a volume solids of 40.00%, a weight solids of 41.55%, a density of 8.5759 lbs./gal., and 3.50% coalescent on latex solids.

Example 58

This example describes a small particle size aggregate for use in giving the aggregate finish a fine texture.

Ingredient	Amount (lbs./100 gal.)
Sand - Small Particle Size	2,211.18

(Sand #90)	

The resulting preformulated aggregate should have a total volume of 100 gallons, a total weight of 2,211.18 lbs., a volume solids of 100.00%, a weight solids of 100.00%, a density of 22.1118 lbs./gal..

Example 59

This example describes the preparation of preformulated large particle size aggregate that gives coarse texture. It can be prepared using a ribbon mixer.

Ingredient	Amount (lbs./100 gal.)
Sand - Large Particle Size (Sand #15)	442.24
Sand - Small Particle Size (Sand #90)	1768.94

The resulting preformulated aggregate should have a total volume of 100 gallons, a total weight of 2,211.18 lbs., a volume solids of 100.00%, a weight solids of 100.00%, a density of 22.1118 lbs./gal.

Example 60

This example describes the preparation of 19 aggregate finish formulations of varying quality, color intensity, and texture. To make these different aggregate finishes different combinations of the small particle size extender preformulation of Example 55, the binder preformulations of Examples 56 and 57, the white pigment prepaint of Example 54, and the large particle size aggregate of Examples 58 and 59 are used. The aggregate finishes are formulated by adding the small particle size extender preformulation to the binder preformulation and then adding the white pigment prepaint, if needed, and finally adding the water and large particle size aggregate. The components thoroughly mixed using a ribbon mixer. The amounts mixed are those shown below. All weights are in lbs., the total volume of each aggregate finish is 100 gallons, formulated to 67% volume solids.

	Weight of Example Prepaints							
Paint	55	56	57	58	59	54	Water	Total
60-1	64.72	429.09		995.56		0.00	10.03	1499.40
60-2	41.60	432.75		995.56		30.90	6.55	1507.11
60-3	6.93	438.24		995.56		77.26	1.34	1518.66
60-4	180.29	337.56		995.56		0.00	27.41	1540.82
60-5	157.17	341.22		995.56		30.90	23.93	1548.52
60-6	122.50	346.71		995.56		77.26	18.72	1560.08
60-7	295.86	246.03		995.56		0.00	44.79	1582.24
60-8	272.74	249.69		995.56		30.90	41.31	1589.94
60-9	238.07	255.18		995.56		77.26	36.10	1601.50
60-10	122.50		340.08	995.56		77.26	18.72	1553.45
60-11	64.72	429.09			995.56	0.00	10.03	1499.40
60-12	41.60	432.75			995.56	30.90	6.55	1507.11
60-13	6.93	438.24			995.56	77.26	1.34	1518.66
60-14	180.29	337.56			995.56	0.00	27.41	1540.82
60-15	157.17	341.22			995.56	30.90	23.93	1548.52
60-16	122.50	346.71			995.56	77.26	18.72	1560.08
60-17	295.86	246.03			995.56	0.00	44.79	1582.24
60-18	272.74	249.69			995.56	30.90	41.31	1589.94
60-19	238.07	255.18			995.56	77.26	36.10	1601.50

The PVC, TiO2 level, expected color intensity, texture, and low temperature flexibility of the resulting aggregate finish coatings are shown below.

Paint	PVC	TiO_2 PVC	Texture	Flex	Color tone	Quality
60-1	70	0	fine	40°F	deep	high
60-2	70	1	fine	40°F	mid-tone	high
60-3	70	2.5	fine	40°F	pastel	high
60-4	75	0	fine	40°F	deep	medium
60-5	75	1	fine	40°F	mid-tone	medium
60-6	75	2.5	fine	40°F	pastel	medium

60-7	80	0	fine	40°F	deep	low
60-8	80	1	fine	40°F	mid-tone	low
60-9	80	2.5	fine	40°F	pastel	low
60-10	75	2.5	fine	0°F	pastel	medium
60-11	70	0	coarse	40°F	deep	high
60-12	70	1	coarse	40°F	mid-tone	high
60-13	70	2.5	coarse	40°F	pastel	high
60-14	75	0	coarse	40°F	deep	medium
60-15	75	1	coarse	40°F	mid-tone	medium
60-16	75	2.5	coarse	40°F	pastel	medium
60-17	80	0	coarse	40°F	deep	low
60-18	80	1	coarse	40°F	mid-tone	low
60-19	80	2.5	coarse	40°F	pastel	low

The aggregate finish coatings shown above represent a range of qualities, textures, and coloring abilities that depend upon the PVC, TiO_2 level, and particle size ratio of large particle size extender. These formulations are not intended to be limited by the example.. For instance, all the extender prepaints/preformulation could be formulated without binder. In addition, the extender prepaint/preformulation is not meant to be limited to the use of nepheline syenite, but to show an example that could also include other commonly used extenders such as, clays, silicas, magnesium silicates, calcium carbonates, etc.

The following list gives no more information than in examples.

Supplier Information

Material Name	**Description**	**Supplier**
Tamol™ 1124	Dispersant	Rohm and Haas Company (Philadelphia, PA)
Tamol™ 1254	Dispersant	Rohm and Haas Company (Philadelphia, PA)
Tamol™ 731	Dispersant	Rohm and Haas Company (Philadelphia, PA)
Acrysol™ DR-3	HASE Thickener/Rheology Modifier	Rohm and Haas Company (Philadelphia, PA)

Acrysol™ RM-2020 NPR	HEUR Thickener/Rheology Modifier	Rohm and Haas Company (Philadelphia, PA)
Acrysol™ RM-8W	HEUR Thickener/Rheology Modifier	Rohm and Haas Company (Philadelphia, PA)
Acrysol™ RM-825	HEUR Thickener/Rheology Modifier	Rohm and Haas Company (Philadelphia, PA)
Rhoplex™ Multilobe 200	Emulsion Polymer Binder	Rohm and Haas Company (Philadelphia, PA)
Rhoplex™ SG-10M	Emulsion Polymer Binder	Rohm and Haas Company (Philadelphia, PA)
RES 3083	Emulsion Polymer Binder	Rohm and Haas Company (Philadelphia, PA)
Kathon™ LX 1.5%	Biocide	Rohm and Haas Company (Philadelphia, PA)
Triton™ CF-10	Surfactant	Union Carbide Corporation (Danbury, CT)
Foamaster™ VL	Defoamer	Henkel Corporation (King of Prussia, PA)
Drewplus™ L-475	Defoamer	Drew Chemical Corporation (Kearny, NJ)
Ti-Pure™ R-746	Titanium Dioxide	E.I. Dupont de Nemours and Co., Inc. (Wilmington, DE)
Ti-Pure™ R-706	Titanium Dioxide	E.I. Dupont de Nemours and Co., Inc. (Wilmington, DE)
Ti-Pure™ R-900	Titanium Dioxide	E.I. Dupont de Nemours and Co., Inc. (Wilmington, DE)
Ti-Pure™ R-902	Titanium Dioxide	E.I. Dupont de Nemours and Co., Inc. (Wilmington, DE)
Minex™ 4	Mineral Extender	Inimin Corp. (Dividing Creek, NJ)
Optiwhite™	Clay Extender	Burgess Pigment Company (Sandersville, GA)
Snowflake™	Calcium Carbonate Extender	ECC International Imerya (Sylacauga, AL)
Vicron™ 15-15	Calcium Carbonate Extender	Pfizer (New York, NY)

Omyacarb™	Calcium Carbonate Extender	Omya (Proctor, VI)
Texanol™	Coalescent	Eastman Chemical (Kings Port, TN)

WHAT IS CLAIMED:

1. A set of different, but mutually compatible, fluid prepaints sufficient to formulate at least one paint line, which set comprises:

(i) at least one fluid opacifying prepaint comprising at least one opacifying pigment;

(ii) at least one extender prepaint comprising at least one extender pigment; and

(iii) at least one binder prepaint comprising at least one latex polymeric binder.

2. The set of prepaints of claim 1, wherein the number of prepaints is from 3 to 15.

3. The set of prepaints of claim 1, wherein the opacifying prepaint further comprises at least one particulate polymeric binder adsorbed onto the opacifying pigment.

4. The set of prepaints of claim 1, wherein the extender prepaint further comprises at least one particulate polymeric binder absorbed onto the extender pigment.

5. A method of forming at least one paint line, which method comprises the steps of:

(a) providing a set of prepaints, which set comprises:

(i) at least one opacifying prepaint comprising at least one opacifying pigment;

(ii) at least one extender prepaint comprising at least onc extender pigment, and

(iii) at lcast one binder prepaint comprising at least one latex polymeric binder; and

(b) dispensing a predetermined amount of the each of the prepaint into containers or applicator(s) to form the paint line.

6. A method of forming a range of paints, the range comprising at least two paint lines, which method comprises the steps of:

(a) providing a set of different, but mutually compatible, fluid prepaints sufficient to formulate at least two paint lines, which set comprises:

(i) at least one opacifying prepaint comprising at least one opacifying pigment;

(ii) at least one extender prepaint comprising at least one extender pigment;

(iii) at least one binder prepaint comprising at least one latex polymeric binder; and

(iv) at least one additional different prepaint selected from the group consisting of prepaints (i), (ii), and (iii); and

(b) dispensing a predetermined amount of each prepaint into containers or applicators to form the range of paints.

7. The method of claim 5 or claim 6, further comprising the step of mixing the prepaints before, while, or after the prepaints are dispensed into the containers.

8. The method of claim 5 or claim 6, further comprising the step of mixing the prepaints before or while they are dispensed into the applicator(s).

9. The method of claim 5 or claim 6, further comprising the step of adjusting the viscosity of the dispensed prepaint(s) before, while, or after the prepaints are dispensed into the containers.

10. The method of claim 5 or claim 6, further comprising the step of adjusting the viscosity of the dispensed prepaints before or while the prepaints are dispensed into the applicator(s).

11. The method of claim 5 or claim 6, wherein at least one additive that enhances the application of the paint or final performance properties of the paint is added to the prepaint(s).

12. The method of claim 11, wherein the additive is an aggregate material.

13. The method of claim 11, wherein the additive is a thickener.

14. The method of claim 5 or claim 6, wherein least one colorant is added to the dispensed prepaints.

15. The method of claim 5 or claim 6, wherein the opacifying prepaint further comprises at least one particulate polymeric binder absorbed onto the opacifying pigment.

16. The method of claim 5 or claim 6, wherein the extender prepaint further comprises at least one particulate polymeric binder absorbcd onto the extender pigment.

17. The method of claim 5 or claim 6, wherein the method is carried out at a paint manufacturing facility.

18. The method of claim 5 or claim 6, wherein the method is carried out at a point-of-sale.

19. The method of claim 5 or claim 6, wherein the method is carried out at a point-of-use.

20. The method of claim 5 or claim 6, wherein the method is controlled by a computer. .

21. The method of claim 5 or claim 6, wherein the number of prepaints is from 4 to 15.

22. A fluid opacifying prepaint having a volume solids content of about 30% to about 70% and a Stormer viscosity of about 50 to about 250 KU, which is useful for formulating a one pack, pigmented latex paint containing other paint ingredients, which prepaint consists essentially of:

(i) at least one opacifying pigment,

(ii) at least one dispersant,

(iii) at least one thickener, and

(iv) water; wherein the dispersant(s) and the thickener(s) are mutually compatible with the pigment(s) and with the other paint ingredients.

23. The prepaint of claim 22, wherein the volume solids content is about 35% to about 50% and the Stormer viscosity is about 60 to about 150 KU.

24. A fluid white opacifying prepaint having a volume solids content of about 30% to about 70%, a pigment volume concentration of about 35% to about 100%, and a Stormer viscosity of about 50 to about 250 KU, which is useful for formulating a one pack, pigmented latex paint

containing other paint ingredients, which prepaint consists essentially of (i) at least one opacifying pigment, (ii) at least one dispersant, (iii) at least one thickener, (iv) at least one film-forming or non-film-forming polymer, and (v) water; wherein the dispersant(s), the thickener(s), and the polymer(s) are compatible with the pigment(s) and with the other paint ingredients; which prepaint is characterized in that it is stable to sedimentation

25. The prepaint of claim 24, wherein the volume solids content is about 35% to about 50%, the pigment volume concentration is about 50 to 100%, and the Stormer viscosity is about 60 to about 150 KU.

26. The prepaint of claim 24, wherein the polymer is adsorbed onto the opacifying pigment.

27. The prepaint of claim 22 or 24, wherein the opacifying pigment is titanium dioxide, zinc oxide, lead oxide, a synthetic polymer pigment, or mixtures thereof.

28. The prepaint of claim 22 or 24, wherein the opacifying pigment is rutile titanium dioxide.

29. The prepaint of claim 27, wherein the synthetic polymer pigment is voided latex polymer particles.

30. The prepaint of claim 22 or 24, wherein the dispersant is 2-amino-2-methyl-1-propanol; dimethylaminoethanol; potassium tripolyphosphate; trisodium polyphosphate; citric acid, polyacrylic acid, diolefin/maleic anhydride adducts, hydrophobically-modified polyacrylic acid, hydrophilically-modified polyacrylic acid, and salts thereof; or mixtures thereof.

31. The prepaint of claim 22 or 24, wherein the thickener is a hydrophobically-modified alkai-soluble or alkali-swellable emulsion (HASE), a hydrophobically-modified, akali-soluble emulsion (ASE), hydrophobically-modified ethylene oxide-urethane polymer, cellulosic, hydrophobically-modified cellulosic, hydrophobically-modified polyacrylamide, polyvinyl alcohol, fumed silica, attapulgite clay, titanate chelating agent or mixtures thereof.

32. The prepaint of claim 24, wherein the polymer is acrylic, vinyl acetate, styrene-acrylic, styrene-butadiene, vinyl acetate-acrylic, ethylene-vinyl acetate, vinyl acetate-vinyl versatate, vinyl acetate-vinyl maleate, vinyl acetate-vinyl chloride-acrylic, ethylene-vinyl acetate-acrylic polymers or mixtures thereof.

33. The prepaint of Claim 32, wherein the polymer further comprising up to 10% by weight of another monomer which is a functional monomer, a non-functional monomer, or mixtures.

34. The prepaint of claim 22 or 24, further consists essentially of at least one additive, selected from the group consisting of an acid, a base, a defoamer, a coalescent, a cosolvent, a mildewcide, a biocide and an antifreeze agent, the additive(s) being present in an amount of less than about 10% by weight, based on the total weight of the prepaint.

35. A fluid pigment extender prepaint, useful for formulating a one pack, pigmented latex paint containing other paint ingredients, which prepaint consists essentially of:

(i) at least one mineral extender having a volume solids content of about 30% to about 70%, a pigment volume concentration of about 35% to about 100%, and a Stormer viscosity of about 50 to about 250 KU;

(ii) at least one thickener; and

(iii) water; wherein the mineral extender(s) and the thickener(s) are compatible with each other and with the other paint ingredients.

36. The prepaint of Claim 35, further comprising a polymeric binder compatible with the mineral extender(s) and the thickener(s).

37. A set of two different, but mutually compatible, fluid prepaints which are useful for formulating a latex paint, which set comprises:

(i) the opacifying prepaint of claim 22 or 24 and

(ii) a latex polymeric binder prepaint having a volume solids content of about 25% to about 70% and a Brookfield viscosity of less than about 100,000 centipoise at a shear rate of 1.25 reciprocal seconds, which binder prepaint consists essentially of a water-borne latex polymeric binder having a Tg of about -40°C to about 70°C; and

(iii) water.

38. The set of prepaints of claim 37, wherein the binder prepaint has a Tg of about –10°C to about 60°C, a volume solids content of about 30% to about 65%, and a Brookfield viscosity of about 100 to about 50,000 centipoise at a shear rate of 1.25 reciprocal seconds.

39. The set of prepaints of claim 37, wherein the binder prepaint further consists essentially of at least one additive selected from the group consisting of an acid, a base, a defoamer, a coalescent, a cosolvent, a mildewcide, a biocide and an antifreeze agent; the additive being present in an amount of less than about 10% by weight, based on the total weight of the prepaint.

40. A set of three different, mutually compatible, fluid prepaints which are useful for formulating a latex paint, which set comprises:

(i) the fluid opacifying prepaint and fluid latex polymeric binder prepaint of claim 35; (ii) a fluid pigment extender prepaint having a volume solids content of about 30% to about 70%, a pigment volume concentration of about 35% to about 100%, and a Stormer viscosity of about 50 to about 250 KU, which extender prepaint consists essentially of at least one mineral extender, at least one thickener, and water.

41. The set of Claim 40, wherein the fluid pigment extender prepaint further consists essentially of a polymeric binder.

42. The set of prepaints of claim 40, wherein the volume solids content is about 35% to about 65%, the pigment volume concentration is about 40% to about 100% and the Stormer viscosity is about 60 to about 150 KU.

43. The set of prepaints of claim 37, wherein the fluid pigment extender prepaint further consists essentially of at least one additive selected from the group consisting of an acid, a base, a defoamer, a coalescent, a cosolvent, a mildewcide, a biocide and an antifreeze, with the additive being present in an amount of less than about 10% by weight, based on the total weight of the prepaint.

44. A paint line produced by a process which comprises of steps of:

(a) providing a set of different, but mutually compatible, fluid prepaints, which set comprises:

(i) at least on opacifying prepaint comprising,

(ii) at least one opacifying pigment;

(iii) at least one extender prepaint comprising at least one extender pigment; and

(iv) at least one binder prepaint comprising at least one latex polymeric binder, and

b. dispensing a predetermined amount of each of the prepaints into containers or applicator(s) produce the paint line.

45. A set of different, but mutually compatible, fluid prepaints sufficient to form at least one paint line useful as an elastomeric coating, which set comprises:

(i) at least one opacifying prepaint comprising at least one opacifying pigment,

(ii) at least one extender prepaint comprising at least one extender pigment; and

(iii) at least one binder prepaint comprising at least one latex polymeric binder; having a Tg less than about 0°C.

46. A method of forming a paint line useful as an elastomeric coating, which method comprises the steps of:

(a) providing a set of different, but mutually compatible, fluid prepaints comprising:

(i) at least one opacifying prepaint comprising at least one opacifying pigment;

(ii) at least one extender prepaint comprising at least one extender pigment; and

(iii) at least one binder prepaint comprising at least one latex polymeric binder having a Tg of less than about 0°C; and

(b) dispensing a predetermined amount of each of the prepaints into containers or applicator(s) to form the paint line.

47. A method of forming a range of paints comprising at least two paint lines useful as elastomeric coatings, which method comprises the steps of:

(a) providing a set of different, but mutually compatible, fluid prepaints sufficient to formulate at least two paint lines, which set comprises:

(i) at least one opacifying prepaint comprising at least one opacifying pigment,

(ii) at least one extender prepaint comprising at least one extender pigment,

(iii) at least one binder prepaint comprising at least one latex polymeric binder having a Tg of less than about 0°C, and

(iv) at least one additional different prepaint selected from the group consisting of prepaints (i), (ii), and (iii); and

b. dispensing a predetermined amount of each of the prepaints into containers or applicator(s) to form the paint lines.

48. A set of different, but mutually compatible, fluid prepaints sufficient to form at least one paint line which is useful as a non-cementitious, aggregate finish, which set comprises:

(i) at least one opacifying prepaint comprising at least one opacifying pigment;

(ii) at least one extender prepaint comprising at least one extender pigment;

(iii) at least one fluid binder prepaint comprising at least one latex polymeric binder; and

(iv) at least one prepaint comprising an aggregate.

49. A method of forming at least one paint line which is useful as a non-cementitious, aggregate finish, which method comprises the steps of:

(a) providing a set of different, but mutually compatible, non-cementitious fluid prepaints, which set comprises:

(i) at least one opacifying prepaint comprising at least one opacifying pigment,

(ii) at least one extender prepaint comprising at least one extender pigment,

(iii) at least one binder prepaint comprising at least one latex polymeric binder, and

(iv) at least one prepaint comprising an aggregate; and

b. dispensing a predetermined amount of each of the prepaints into containers or applicator(s) to form the paint line.

50. A method of forming a range of paints, the range comprising at least two paint lines which are useful as a non-cementitious, aggregate finishing coating, which method comprises the steps of:

(a) providing a set of different, but mutually compatible, fluid non-cementitious prepaints sufficient to formulate at least two paint lines, which set comprises:

(i) at least one opacifying prepaint comprising at least one opacifying pigment;

(ii) at least one extender prepaint comprising at least one extender pigment;

(iii) at least one binder prepaint comprising at least one latex polymeric binder;

(iv) at least one prepaint comprising an aggregate; and

(v) at least one different additional prepaint selected from the group consisting of prepaints (i), (ii), (iii), and (iv); and

(b) dispensing a predetermined amount of each of the prepaints into containers or applicator(s) to form the paint lines.